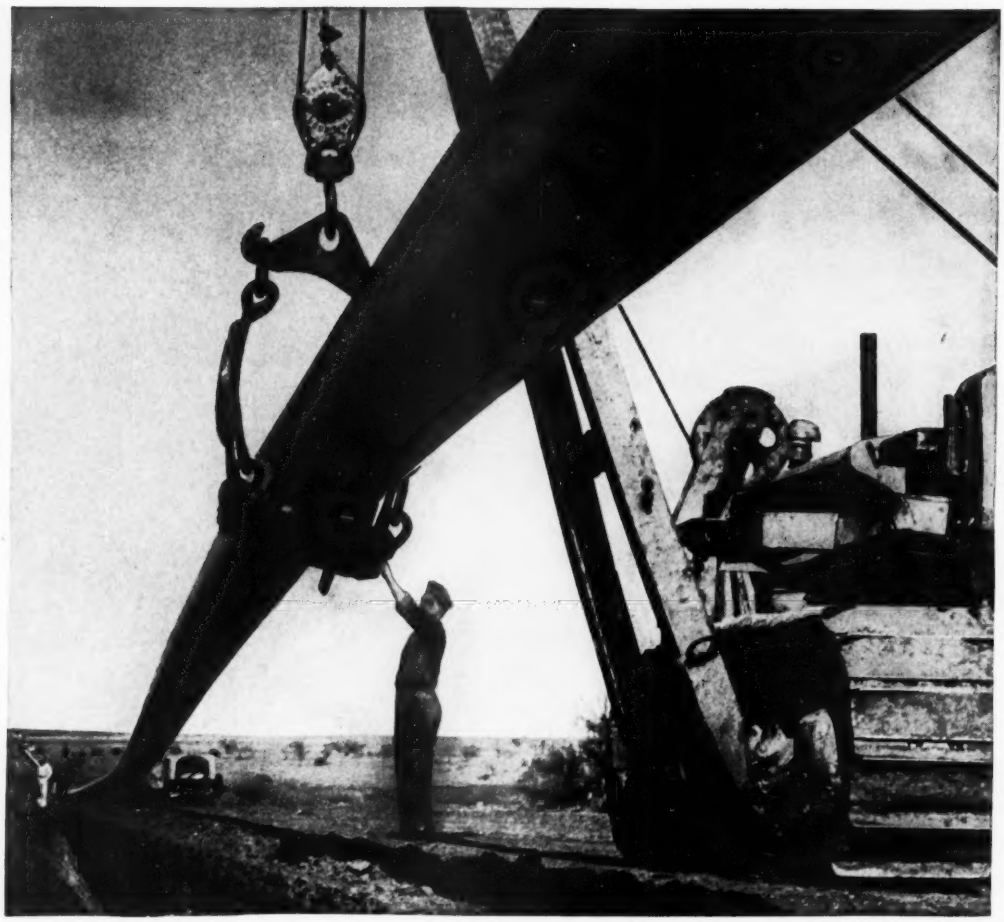
THE CORNELL ENGINEER

COLLEGE OF ENGINEERING · CORNELL UNIVERSITY

How America's "Underground" works for you



THERE are enough miles of oil and natural gas pipe lines in the U. S. A. to circle the world at the equator 16 times!

This vast, 402,000-mile network is made up of crude oil lines, oil products pipe lines and natural gas lines. This network has helped to make the benefits of gasoline, fuel oil and oil products readily available to everybody . . . it has helped to bring gas heating to many parts of the country.

But this constantly-expanding underground network is far from complete. It will require thousands more miles of pipe in the near future. To help meet this demand, United States Steel will put two more large-diameter pipe mills into operation in the next few months.

The steel industry is a growing industry, not only in terms of physical plants and facilities, but in terms of personnel, too. At the present time, the number of United States Steel employees participating in educational programs is exceeded in size only by the student bodies of a few of our largest universities.

The fundamental objectives of these programs are to assure employees maximum opportunity for personal development and to provide them with a sound foundation for advancement within the organization.

The training programs in United States Steel have become the "pipe line" to successful careers for hundreds of capable young men.

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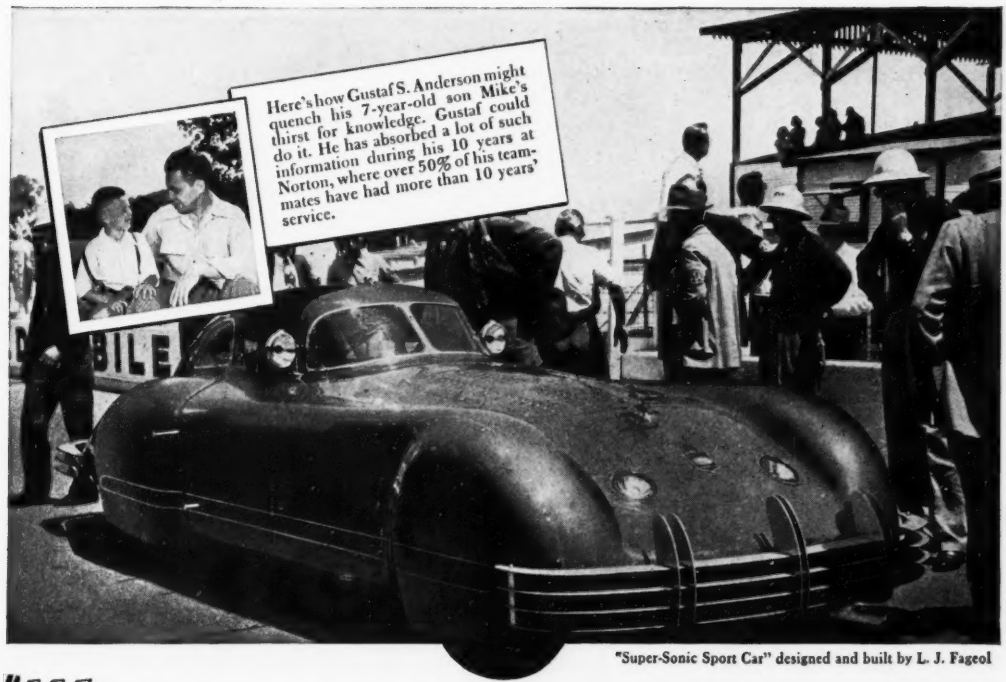
UNITED STATES STEEL


Here's how Gustaf S. Anderson might quench his 7-year-old son Mike's thirst for knowledge. Gustaf could do it. He has absorbed a lot of such information during his 10 years at Norton, where over 50% of his team-mates have had more than 10 years' service.

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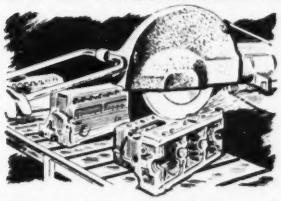
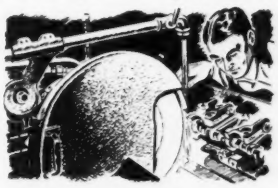


"Norton grinding wheels help — and they start on the first rough castings. Our hones make cylinder walls smooth and long-lasting. Dies and tools are manufactured and maintained with Norton grinding wheels.



"Camshafts must be true, or engines won't run smoothly. Norton Cam-O-Matic grinding machines finish cam contours to close precision. In fact, these speedy, automatic grinders help lower mass production costs.

"New cars look better every year. And their smoother surfaces for better paint jobs come from things like Behr-Manning abrasive discs. Behr-Manning, remember, is an important member of the Norton family."

"Of the thousands of parts that make up a modern car, nearly all of them are made better by the touch of products made by the Norton family. That also applies to just about every other industry, large or small. That's why I like my job of making better products to make other products better."

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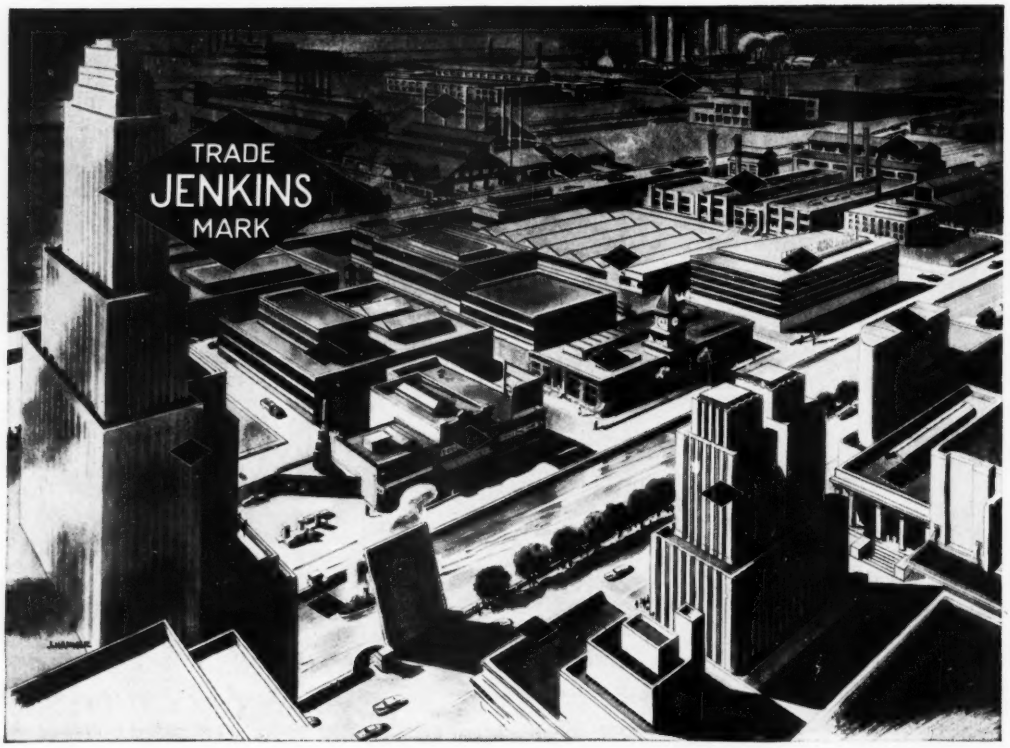

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The CORNELL ENGINEER

Volume 15 February, 1950 Number 5

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COVER—Fall Creek Gorge and the Stewart Avenue Bridge adjoining the Cornell Campus, as seen in 1906—Note trolley car and horse drawn carriage.

Member of The Engineering College Magazines Associated
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101 Park Ave., New York and 605 N. Michigan Ave., Chicago

Arkansas Engineer
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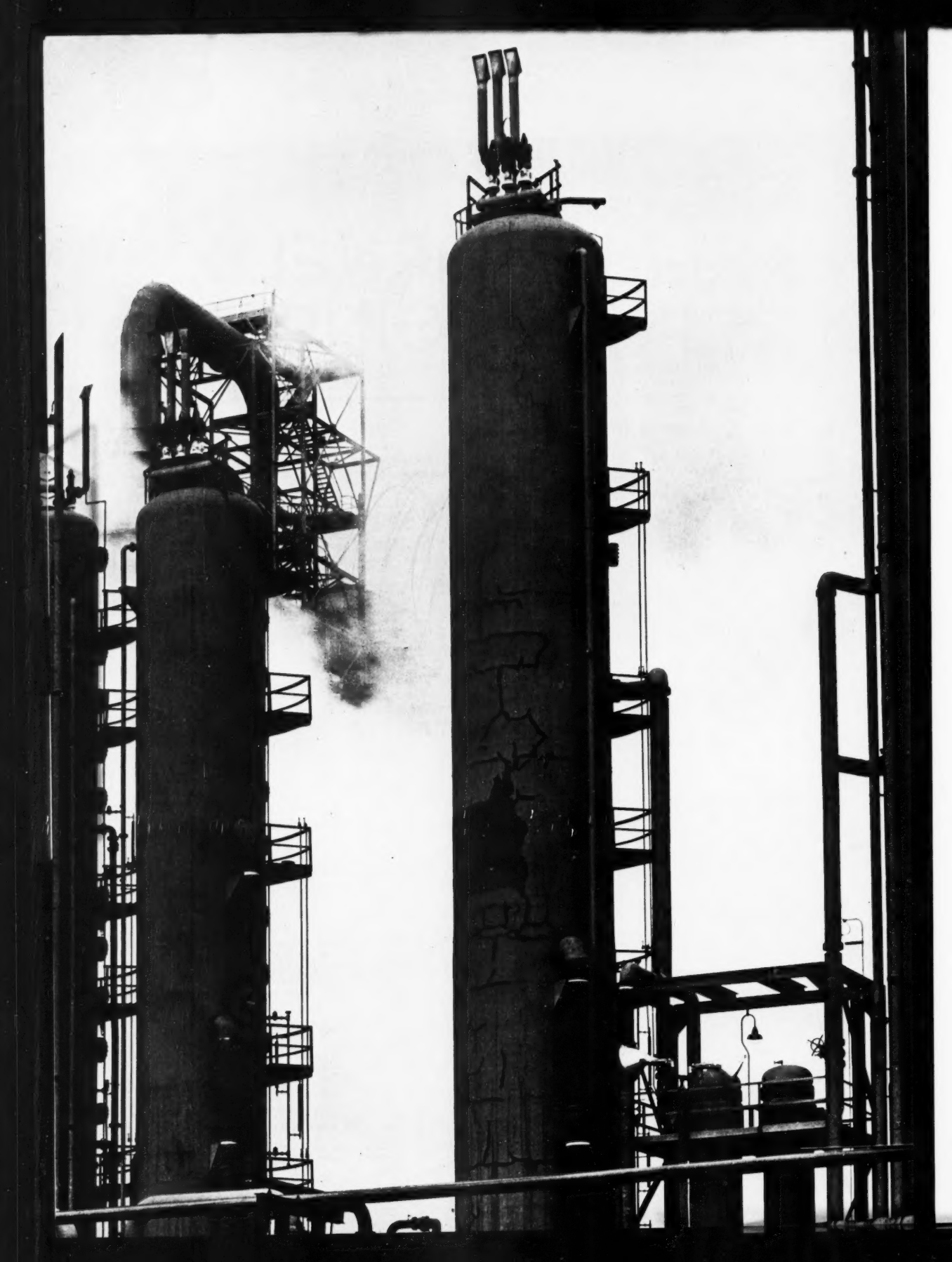
Published monthly—October to May—by the Cornell Engineer, Inc., Lincoln Hall, Ithaca, N. Y. Edited by the undergraduates of the College of Engineering, Cornell University. Entered as second class matter at the Post Office at Ithaca, N. Y., under Section 103, Act of October 3, 1917.

Subscription per year: regular $2.00; with membership in the Cornell Society of Engineers $3.00 (See President's page); student $1.50; single copy $.25.



What Does Industry Expect of College Men?

By JOHN L. MUNSCHAUER, A.B. '40

Director Cornell University Placement Service

Illustrated by Dorothy Larkin

YOUR editors asked me to write an article on what industry expects from college graduates. At first blush this appeared to be impossible because, in the sense that expect means desire, or want, few generalities are applicable to all employers. Of course, I could generalize about such things as honesty, loyalty, and integrity; but most of us know about these. Other factors can't be so easily codified. What about this statement from the recruiting pamphlet of a large and progressive company: "The man who wishes to act quickly and intuitively on the commercial expediency of a project . . . is likely to be less satisfied (in this company) than one who desires an opportunity to weigh all factors involved before taking action?" Couldn't an antithetical statement be made about other companies which face different problems? The desirability of many qualifications and characteristics differs so much from one company to the next that I find it impossible to write anything like the ten commandments of industrial conduct which, if followed, would fulfill the desires of every employer.

The ultimate in security is a life sentence in the penitentiary.

These immense fractionation columns are used in the production of Butadiene.

—Courtesy Standard Oil Company

Making An Impression

Expect also means anticipate, and in that sense an article was possible if I wrote to employers and asked them what they have learned to expect from college graduates. I wrote a variety of employers and asked them to relate experiences, good, bad or indifferent, that they have had with college men. Their response covered a diversity of complaints and compliments. One company complained about a graduate who was so lazy that he habitually left his hand resting on the scales when weighing material. Their discouragement with college men was soon alleviated by another graduate who was asked to develop a thickness tester for some specially developed paper. This was to be a difficult assignment probably requiring prolonged investigation and his superiors suggested X-ray transmission and beta-ray technique. The boy delighted the company by returning in a short while with the simple solution of placing a desk lamp above the paper and a light meter beneath, effectively solving the problem with the simplest means available.

Security Through Accomplishment

Employers told me similar stories, but there were significant complaints which ran throughout most letters, and none cropped up more often or prominently than preoccupation with security. Security seems to be a goal which is the nemesis of many job hunters and employees. Evidently no one has defined security, but to some it seems to concern a job which begins with a general training program, followed by a definite schedule of pay raises and a pension at age 65. There may be such jobs, but a factor ignored by some college men is that these are the rewards of adequate performance on the job. In fact, in these times when industry has had to cut back on production and employment, a college man is in a delirium if he doesn't turn in a better than adequate performance. Most companies will go to all ends before they let

Some men are so preoccupied with what they will be doing twenty years from now that they neglect present duties.

out an outstanding man. As Carl Lauterbach of Eastman Kodak said, "Security for any individual, in the most fundamental sense, rests primarily in a record of accomplishment." A college man can accept no other concept or alternative except, possibly, one offered by Kenneth Meade of General Motors, who said that the ultimate in security is a life sentence in a penitentiary.

Choice of Field

Closely allied with the problem of security is the concern of college men with the future. Some men are so preoccupied with what they will be doing twenty years from now that they neglect present duties. This common complaint is difficult to understand. It should be obvious to any young college man that day-to-day and week-to-week performance is the only measure of ability by which an employer can judge potential worth. Perhaps it is too obvious. Possibly part of the trouble is that many people take jobs in which they have no interest except "the money in it." It is dangerous to take a job just for money in spite of disinterest. There are many $2000 and $3000 a year salesmen who might have made good $10,000 designers if they hadn't believed the "experts' who predicted that the big money was in sales. There may be big money for those with top qualifications but there is not much for the lunatic fringe.

Matching Aptitude With Opportunity

This crystal gazing can be detrimental to a man hunting a job if it's carried too far. Student questions about the future of business torture placement officers. We are constantly asked questions such as: "What is the employment picture going to be two years from now?" "Can you name the companies with the best future?" One student asked, "What new fields are undiscovered?" If we could answer such questions we would be down in New York playing the stock market. These are good questions worthy of thought but a student should spend some time analyzing his personal qualifications and comparing them with those required for specific vocations. It would be worthwhile to find out what characteristics are important for production, sales, design, and other vocations. What challenges do they offer? Does the fact that I like to meet people mean that I shall succeed as a salesman or does it just mean that I am a fairly normal social animal? Wouldn't I get as much fun discussing development problems with associates and wouldn't the work use more of my aptitudes? These are the kind of questions a man should ask himself.

One way to find some of the answers is to visit men in industry and ask them about their various duties and problems. I have known students whose intelligent questions have produced job offers. Anyone

THE AUTHOR

Mr. Munschauer received his A.B. degree from Cornell in 1940, where he majored in Economics. As an undergrdauate he was manager of the varsity boxing team.

Upon graduating, he went to work for The National Gypsum Company as a sales correspondent, in the field of building materials. Mr. Munschauer entered the military service early in the war, and served for five years in the Infantry, leaving the service as a first lieutenant.

After working for the Wearever Aluminum Company as a salesman for a short period in 1946, he returned to Cornell in 1946 to assume the directorship of the University Placement Service, the position in which he has become well

John L. Munschauer

known to many a young graduate engineer.

doing this, however, should realize that people love to talk about themselves, and, given an opportunity, will pour out their likes, dislikes, and discouragements. The chances are that they will recommend any profession but their own and you may have to pin them down to what they actually do. Don't expect to find the final answer; just try to enter a job with your eyes a little wider open.

Importance of Self-Expression

A disappointment was the many complaints about engineers' inability to express an idea. The inability to express an idea will bring nothing but grief. I hope that the English courses in the five year engineering program at Cornell will allay this fault in our engineers. A story circulates on this campus that one of our professors marks examinations on the basis of a possible ten for their technical content and allows another possible ten for the way ideas are expressed. The two marks are then multiplied for a final grade which students tell me is seldom one hundred. I have never checked this story because I am too intrigued to invite disillusion. If true, his men will thank him later when they find that an idea is effective only when it is clearly expressed. An unintelligible idea yields nothing.

To express an idea, a knowledge of English and ability to spell are necessary. Some engineers rationalize their poor English and spelling as a mark of their profession. Unfortunately employers don't share this casual attitude. I once asked an employment manager whether he considered letter writing an effective way to find a job. He said, "I have just finished reading one hundred and ninety-five letters of application. Only ten of them were free from grammatical errors and misspellings. Only two of these expressed succinctly who they were, what they wanted, and why they wanted it. We shall invite these men to visit us and if their knowledge, personality, and grooming equal their letters we shall create openings for them." A letter of application with misspellings and grammatical errors is infinitely worse than no letter at all, as it effectively negates other approaches

It's dangerous to take a job just for money in spite of disinterest.

to an employer.

Among other grievances, employers said that young people tend to brood over the ineptitudes of their associates, particularly their bosses, while giving little thought to their own weaknesses. One company told of a young college graduate whose contempt for his non-college boss became so unbearable that he quit his job, saying that he was wasting his talents, but suggesting that he would be glad to come in and help the man out on a consulting basis any time he was needed. There is quite a difference of opinion between employers and some students who don't think marks are important. This is not of much concern to employers who solve the problem by the simple expedient of not hiring poor students. It was interesting that not one company commented on the technical ability of college men.

Doing A Little Extra

Unfortunately, while employers were often high in their praise of college graduates, their eulogies weren't as clearly defined and as classifiable as their complaints. One employer, however, told me a story about a recent Cornell graduate as an illustration of a desirable kind of performance industry expects from college men. This story happens to concern a Cornell graduate from the College of Arts and Sciences, and while it's sacrilegious to mention this fact in the CORNELL ENGINEER, most engineers are so eager to emulate their friends in the Arts College that they will want to know their methods of achieving success. This graduate got a job in a chain store where his first training assignment was to observe methods of ordering and warehousing. He learned that the company found it inefficient to ship small packages from their warehouse, and on small orders a large package was made up containing a variety of articles. For example, if a store ordered hammers it also received saws, screw drivers, and other tools. The method is satisfactory providing all items sell proportionately, so the trainee inquired how this was controlled. He learned that there

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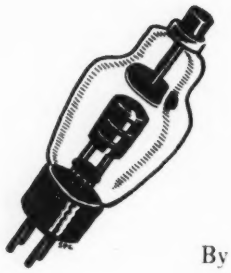
The inability to express an idea brings nothing but grief.



Industrial Electronics

By PROFESSOR BURDETTE K. NORTHROP

All Illustrations Courtesy the Author

By what ever name the present decade may be designated in the far future, that name will surely include a distinctive suggestion of electronics. The growth of electronics, particularly its application in industry, is becoming an outstanding feature of current technical development.

Development of Cornell's Electronics Course

The recognition of electronics as an area of study broader than that once known as "Radio", caused the Electrical Engineering School in 1937 to introduce into the curriculum a course known as Electronics. This course was under the able supervision of Prof. W. C. Ballard. The present courses in basic Electronics are the results of evolution from this first course. All electrical engineering students are now required to take these basic courses in which they become familiar with the characteristics of the more common electronic units; such as the vacuum tube used in radio, gas tubes, and photo cells, together with the operation of these units in a number of the most common circuits. These circuits include rectifiers, oscillators, and such instruments as the oscilloscope and vacuum tube voltmeter.

Scope of Electronics

Electronics might now be defined as a study of those units in which an electric current flows through space, generally an evacuated space or one containg a gas. Today the term electronics also includes the circuits in which those units are used, since such electronic units generally have non-linear characteristics. The study of circuits containing non-linear units is more complex than the study of circuits containing linear units only. For this reason there is a tendency to include under electronics the study of other units which, although not electronics in the strict sense, have characteristics similar to an electronic unit, and the methods of studying one are applicable to the other.

The vacuum tube, so common in our radio and television sets, is a typical electronic unit. For roughly 30 years vacuum tubes have been used by the public in radio sets. Yet industry definitely preferred not to use them because they were so fragile and likely to become useless at a critical time. Not until World War II developments proved that rugged vacuum tubes could be built, did industry recognize the possibilities of this one electronic unit and begin to plan the use of vacuum tubes, generally. Another important element in developing this recognition by industry was the return of the veterans into industry. These veterans were now aware of the great variety of useful functions which the vacuum tube and other electronic units could perform in proper circuits.

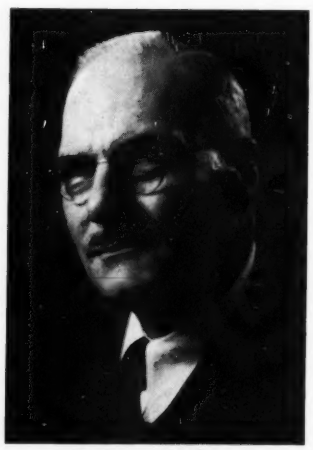
Practical Applications

Today there are many applications of electronics in industry. Instruments are available for measuring pressure, temperature, time, distance, acidity, etc. by essentially

THE AUTHOR

After graduating from Cornell in 1918 with the M.E. (in E.E.) degree, Professor Burdette K. Northrop became a member of the Electrical Engineering staff in Franklin Hall, where he has taught continuously except for a six year period when he was a professor of Physics at Colgate University. During the war he supervised and taught war training courses in radio and engineering electronics in the Southern Tier of New York State.

His chief interest, next to teaching, is the development of electronics, with which he has maintained contact through sabbatic leaves spent at the Allis-Chalmers Mfg. Co., and the General Electric Co. He has also spent many summers in research and engineering development. Professor Northrop is



Professor Northrup

a member of Eta Kappa Nu, A.I.E.E., I.R.E., and A.S.E.E.

electronic devices which give a more accurate, a more rapid, or for some other reason, a more satisfactory indication of the quantity to be measured. The variation of this measured quantity can readily be recorded on a chart for reference. Also, the measured quantity has already been converted to an equivalent electrical quantity which can be used to set up a close control of the process.

An electronic motor drive can hold the speed of a machine essentially constant at any set speed. Generally a d.c. motor is powered by rectified a.c., rectified by grid-controlled gas tubes, whose grids allow the current to start flowing at any desired time in the cycle. These grids are controlled through amplifiers to adjust and hold the motor voltage so that very accurate machine work may be done where load and line voltage variations would ordinarily make this impossible.

Temperatures can be maintained within very close limits by setting up a Wheatstone bridge using one resistor which varies with temperature and placing it at the point where the temperature is to be controlled. As the temperature changes, the resistance changes and unbalances the bridge. This unbalance, through amplifiers, drives a small motor which moves a recording pen over a temperature chart. It may simultaneously change the heat supply if the temperature is outside of the desired limits.

Machined parts can be sorted accurately for size by the use of photo-electric cells. The shadow of the part to be sized is thrown on the light sensitive cell and if it is too small there is more than normal light striking the sensitive cell. The current through the cell is proportional to the light striking the cell and when amplified operates to automatically reject the part. If the part is too large it is also rejected since the light on the cell is insufficient.

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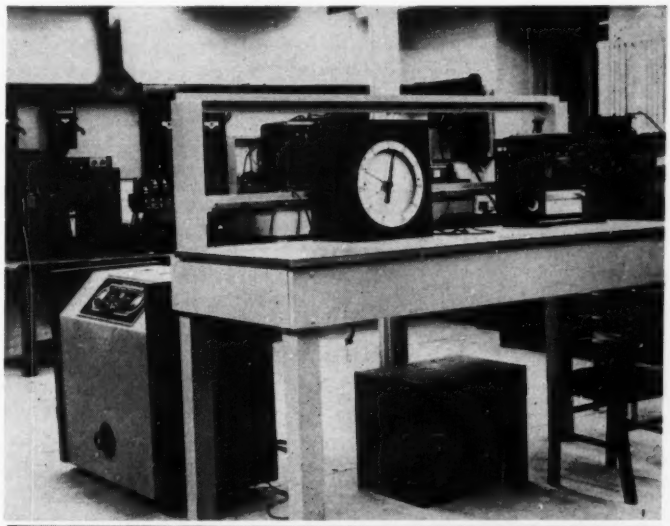
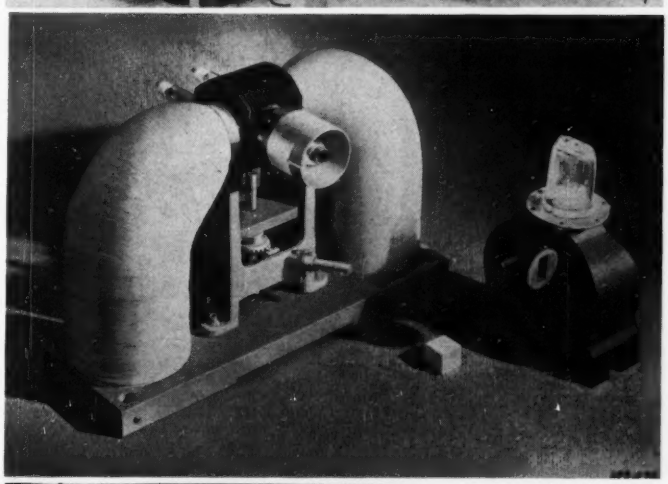
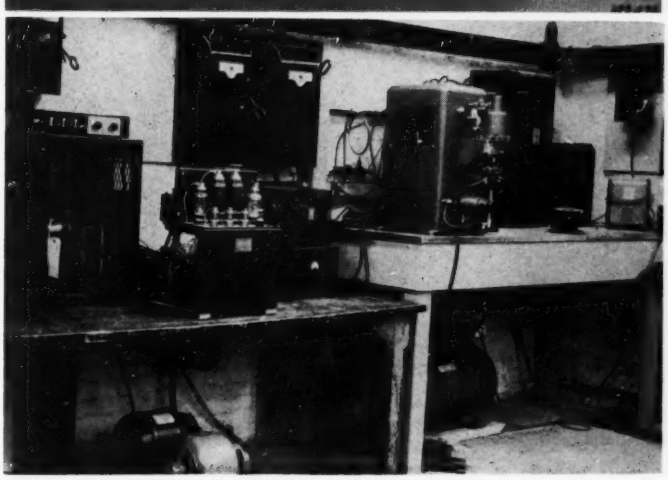
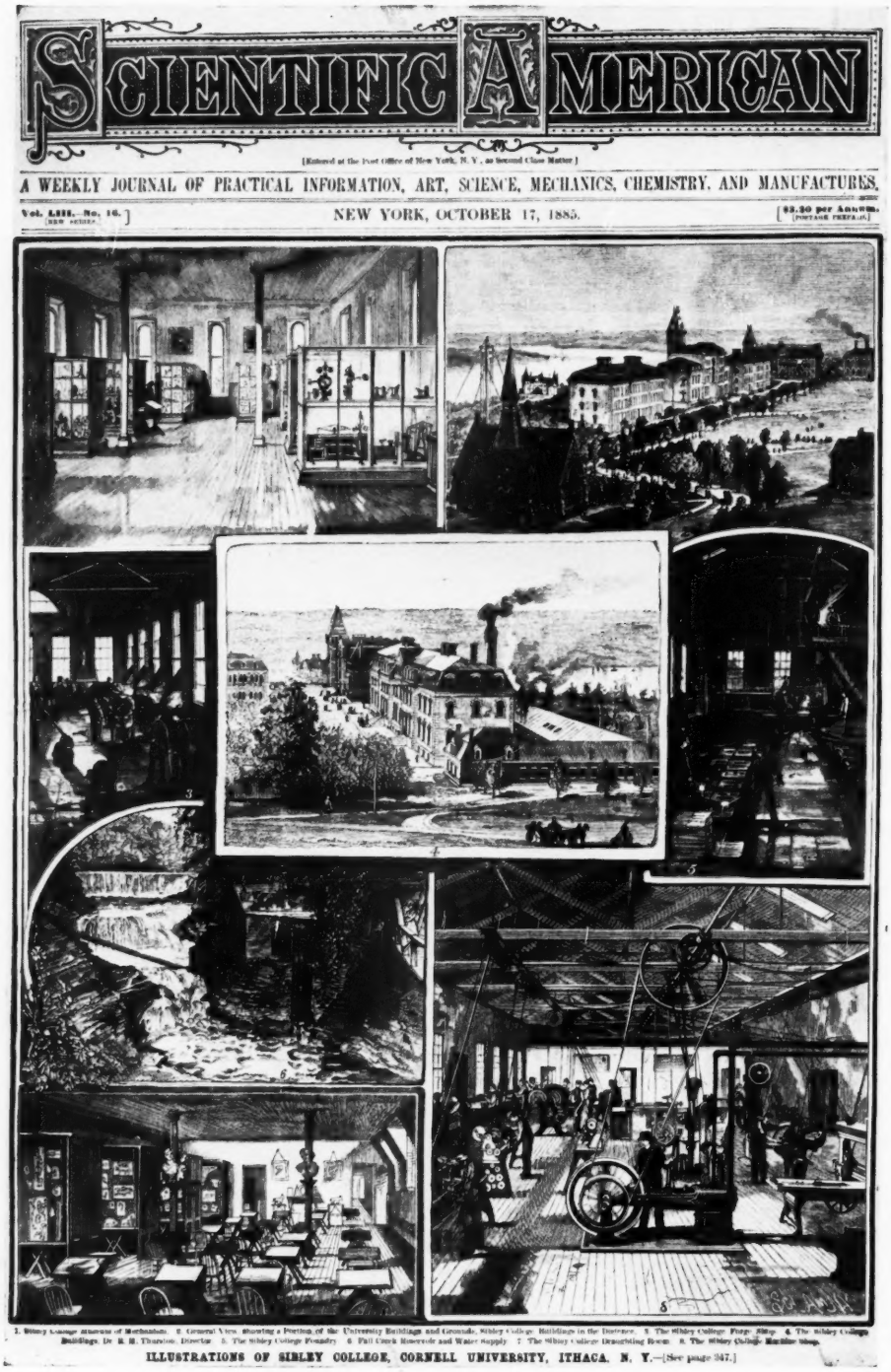






Top: A view of the electronics laboratory in the EE school at Cornell. Center: A 2800 megacycle and a 55 megacycle magnetron shown at left and right respectively, each mounted in its magnet. Bottom: An electronic welding control set up shown in the laboratory.


SCIENTIFIC AMERICAN
[Entered at the Post Office of New York, N. Y., as Second Class Matter.]
A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.
Vol. LIII.—No. 16. [NEW SERIES.]
NEW YORK, OCTOBER 17, 1885.
[$3.20 per Annum. [POSTAGE PREPAID.]
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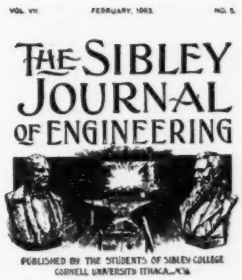
1. Sibley College Museum of Mechanism. 2. General View, showing a Portion of the University Buildings and Grounds, Sibley College Buildings in the Distance. 3. The Sibley College Forge Shop. 4. The Sibley College Buildings. Dr. R. H. Thurston, Director. 5. The Sibley College Foundry. 6. Fall Creek Reservoir and Water Supply. 7. The Sibley College Drawing Room. 8. The Sibley College Machine Shop.

ILLUSTRATIONS OF SIBLEY COLLEGE, CORNELL UNIVERSITY, ITHACA, N. Y.—[See page 247.]

SIBLEY COLLEGE IN 1885

From an old cover of the *Scientific American*

A Short History of the CORNELL ENGINEER


VOL. VII FEBRUARY, 1903 NO. 5.
THE SIBLEY JOURNAL OF ENGINEERING
PUBLISHED BY THE STUDENTS OF SIBLEY COLLEGE
CORNELL UNIVERSITY ITHACA, N.Y.

By DAVID G. WHITE, ChemE. '50

THE mechanical and electrical students for many months have longingly desired their own and peculiar publication — something which they could call their own and where their pens could be as deeply technical as desired."

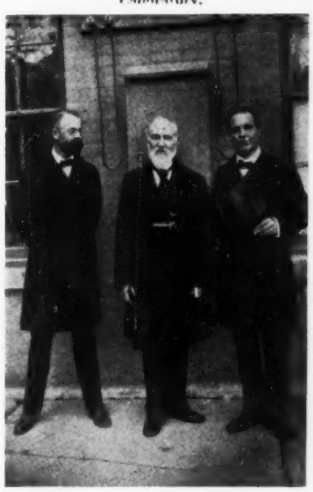
With these words, Sibley students, on a certain March day in 1887, were introduced to a new feature of the Cornell campus—a monthly publication by the name of the *Crank,* published by a few of their fellow undergraduates.

The *Crank's* beginning was auspicious enough, since this very first issue contained an article "The Telephone and Photophone," by one Alexander Graham Bell. But this was also the beginning of what was to become in future years the magazine in which this article is printed. In 1892, the *Crank* became the *Sibley Journal of Engineering,* and by the merger in 1935 of the *Journal* and the *Cornell Civil Engineer,* which had been inaugurated quietly in 1893, the CORNELL ENGINEER was formed.

In keeping with the other recapitulations that have marked the turn of this half-century, it is interesting to uncover the history of the life of these publications.

Originating at a time when Sibley College was in a state of rapid development, the *Crank* was received almost immediately with great favor by both students and alumni. It consisted only of one or two articles, with no illustrations, a few short columns concerned with the college and the alumni, an editorial, and perhaps a description of recent inspection tours of Sibley classes; yet it prospered, and subscriptions were soon secured. In fact, the editor, David B. Oviatt '87, was proud to announce in the May issue that the *Crank* would become a bi-weekly in the following fall, because of the abundant amount of editorial material. However, his successors predicted that this course would be too difficult to follow financially, and in October, the *Crank* reappeared as a monthly.

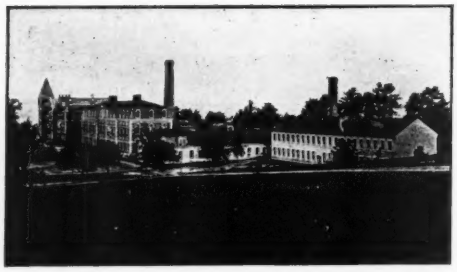
In 1902, Lord Kelvin favored Cornell with a visit, and the *Sibley Journal* printed this picture of the famous physicist, flanked by president Schurman (left) of the University and Professor Nichols, standing just outside the old Dynamo Laboratory.

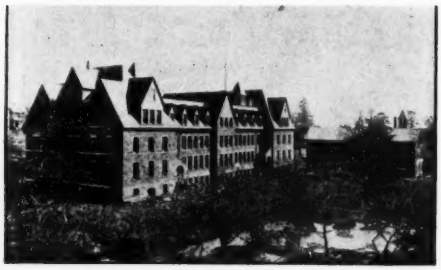


The Fat Years

After successfully completing five years of publication, it was decided to change the name of the *Crank* to the *Sibley Journal of Engineering,* to take effect in the Fall of 1892. According to the editors at that time, "the new title is fully as suggestive as the *Crank,* but lacks that embarrassing ambiguity which often results from the use of the present title." In mood with the change of name, an octavo form was adopted, and the page size was reduced to about six by nine inches. This format was to characterize the *Sibley Journal* until 1915.

It was in this same year, 1892, that a new constitution was drawn up for what was called the Association of Civil Engineers, which previously had been in existence off and on for twelve years at Cornell. Consisting of all graduates, seniors and juniors of the College of Civil Engineering, the new Association had as one of its objects the communication to all graduates "of the progress of our College, by means of circular letters and the publications." Hence, an undergraduate publications committee was set up,





Two views of the engineering campus before the turn of the century, showing Sibley College with the old Power House and Lincoln Hall with adjoining laboratory.

and in June, 1893, the first volume of the *Transactions of the Association of Civil Engineers* was published. Supported by membership fees, the *Transactions* contained addresses by non-resident lecturers, miscellaneous papers, the constitution, and a list of members of the Association.

"The Civil Engineer"

The *Transactions,* after continuing on an annual basis until 1906, was supplanted by the appearance in March, 1907, of the first issue of the *Cornell Civil Engineer,* under the editorship of Laurence J. Conger, '07. Though still referred to as the Transactions of the Association, the *Civil Engineer* established itself as a monthly and became, in the words of the editors, one of a "number of radical changes in the life and policy of the college during the past two years [which include] the establishment of a successful honor system, the introduction of a distinctly social atmosphere into the Association meetings, the formulation of a plan for an undergraduate college club and the publication of a monthly periodical . . ."

It is reasonable to expect that the format of these original volumes of the *Civil Engineer* should resemble closely, as they did, that of the *Sibley Journal,* since the *Journal* had already demonstrated its acceptability. And in the years to follow, the editorial policies of the two magazines were to remain surprisingly consistent. Both continued to publish technical articles that ranked with the finest in the engineering journals of the day. The *Journal* had already received a "Grand Prix" award at the Paris Exposition of 1900, since it could claim such contributors as R. H. Thurston, W. F. Durand, E. L. Nichols, and H. J. Ryan, all prominent faculty of the University. McGraw's *Engineering Record* commended the *Civil Engineer* in 1913 for its excellent technical material and alumni news, and again in 1915, it cited that "recently the *Cornell Civil Engineer* covered itself with glory by getting out a special souvenir number, reporting the activities and papers of the first annual Cornell Good-Roads week. The issue combines the March and April numbers and makes a book of 262 reading and 28 advertising pages. It is a valuable volume for the highway engineer . . ."

The Lean Years

Unfortunately, the good intention of these editorial praises was little help to either magazine in the next four years. The war abroad in 1914 had a disturbing influence on conditions here at home. Though in 1915 the *Sibley Journal* was fortunate enough to increase its page size to nearly that of the present-day ENGINEER, the directors were forced to authorize, at a meeting on November 17, 1916, an expenditure of $200 for a campaign to solicit the alumni for subscriptions, on a premium basis. A list of premium offers was soon distributed, announcing that with $2.00, the price of a subscription to the *Sibley Journal,* one could obtain, absolutely free, anything from a Starrett speed indicator to a Cornell record by the Glee Club. To further strengthen the treasury, the *Journal* board even ventured into another business, as it became the Ithaca agent for Lefax, a system for conveniently keeping all notes and data sheets for "instant reference." In January, 1918, the *Journal* appealed editorially; some fifty subscriptions had been cancelled, and the expense of two directory numbers had practically wiped out the profit for the past two years. But all was in vain. A few months later, the announcement was regretfully made that publication would be suspended with the November, 1918, issue. As the *Journal* put it, "the present establishment of a Student Army Training Corps at Cornell with the accompanying military regulations will make the continuation of usual student enterprises not only unpatriotic but even impossible."

World War I

A comparison shows the relative situation of the *Civil Engineer* to be even worse during this period. A letter dated January, 1917, from C. L. Crandall, Professor Emeritus and a member of the Advisory Board, to an alumnus, indicates that the expense of two Good-Roads issues and slack collections from subscribers had caused the *Civil Engineer* to be in debt for several years. So in October, 1918, the *Civil Engineer* also suspended publication, not without remarking in June that "if the geographical list [of civil engineering graduates] is published next year, it is hoped that Berlin will demand four pages."

With the war over in November, 1919, it was only a few months before both magazines reappeared, seemingly sound. The *Journal* commented that "the Vocational School, the U.S. School of Military Aeronautics, and the Students

Army Training Corps are now things of the past. The fraternity houses have been turned over to the respective fraternities. Regular university instruction, undiluted with kitchen police and guard duty, is once more being given."

The *Civil Engineer*, only a year after the war, increased its page size to that of the *Journal* and began a campaign that soon was to enliven its pages considerably. A contribution box was placed in Lincoln Hall; "in this way," it reported, "we are planning to give the *Cornell Civil Engineer* a human touch." Incidentally, that same contribution box still hangs today in the reading room of Lincoln.

Formation of National Organization

Another milestone in the life of these publications was soon reached with the activation of the Engineering College Magazines Associated (to which the CORNELL ENGINEER now belongs). Of E.C.M.A.'s beginnings, it is known that a preliminary conference was held in Chicago in February, 1921, at which a constitution was adopted by twelve magazines, including the two local publications.

Interest in E.C.M.A. continued at Cornell, for both magazines soon strove to bring one of the annual conventions to Ithaca. This was finally accomplished in 1925, and according to a subsequent issue of the *Civil Engineer*, was most successful, especially the convention banquet at Risley Hall where "the delegates swooped down upon the feminine citadel en masse, and although we confess our ignorance as to whether or not the coeds are corresponding more than usual with certain people in certain college towns, still we know that many a smiling, yea, even loving glance, was exchanged between the fair waitresses and the lads from out where men carry six-shooters."

Indecision

As the *Journal* and the *Civil Engineer* continued through the years, it became increasingly obvious to both that a merger of the two publications would be advantageous. Yet until the final consolidation in 1935, there had been but few instances when both magazines had agreed on the question, and all attempts had been unsuccessful.

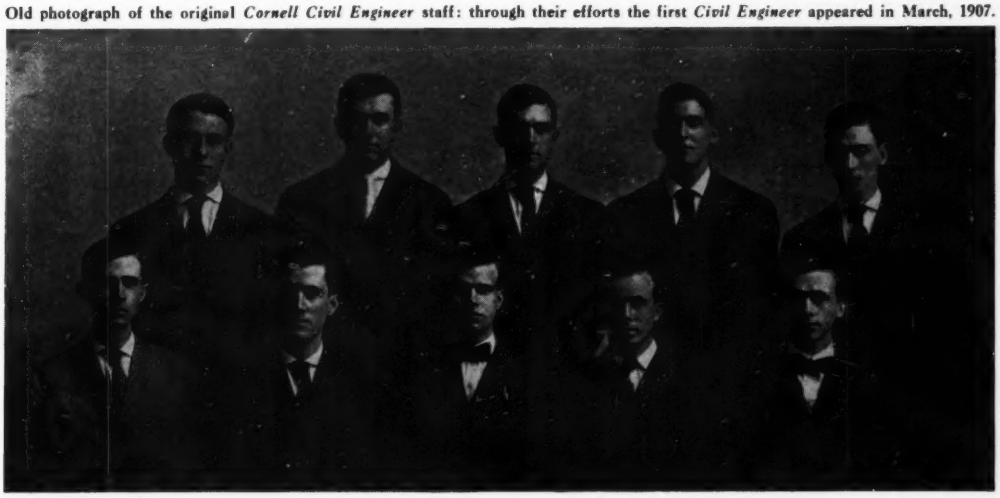
Even as early as 1915, the *Journal*, possibly visualizing the next few years to come, proposed a plan of amalgamation, not only with the *Civil Engineer*, but also with the *Cornell Chemist* and the *Cornell Architect*, two budding publications of that period. In an editorial the *Journal* pointed out that this would mean "that the continued piling up of debts by board after board of the *Cornell Civil Engineer* would cease instantly, and that the *Sibley Journal* itself would be set on a much firmer basis." After several combined board meetings, the civil engineers rejected the plan on the grounds that the *Journal* was not a true student publication. To this point, the *Journal* violently objected. Similarly, the plan was turned down by the *Chemist*, since it felt it would be left out in the cold, and it even hinted that at the time, four members of one fraternity alone were on the *Journal* board, to which the *Journal* answered, "A ridiculous suggestion." To make things worse, the *Architect* just did not care to consolidate, and so the noble plan of the *Journal* not only collapsed; it seemed to bring about a wrath of accusations upon its originators.

After the end of World War I, the *Journal* again approached the *Civil Engineer*, but by now the magazines differed even more in editorial policy. As a result, the *Civil Engineer* declined the invitation, since it felt it would be restricted to the highly technical type of articles that would be less desirable to the alumni subscribers.

Thus, despite occasional discussions, the two magazines continued separately until the effect of the Depression finally served to bring the problem to a head. By April, 1933, the *Journal* found its financial situation critical and considered suspending the May and June issues because of a deficit. The *Civil Engineer* reported a total student circulation of only 37 in the Fall of

(*Concluded on Page* 32)

Old photograph of the original *Cornell Civil Engineer* staff: through their efforts the first *Civil Engineer* appeared in March, 1907.



Cornell Society of Engineers

107 EAST 48TH STREET 1949-1950 NEW YORK 17, N. Y.

WILLIAM LITTLEWOOD, *President* .....166 Brompton Road, Garden City, N. Y.

ROBERT M. SMITH, *Executive Vice-President* 210 Orchard St., East Rutherford, N. J.

PAUL O. REYNEAU, *Secretary-Treasurer and Representative, Cornell University Placement Service* 107 East 48th St., New York 17, N. Y.

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LINTON HART, *Vice-President* .....418 New Center Bldg., Detroit 2, Mich.

THOMAS S. McEWAN, *Vice-President* .....1046 Dinsmore Road, Winnetka, Ill.

Honorary President: S. C. Hollister, Dean of the College of Engineering

Honorary Vice-Presidents:

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N. A. Christensen, Director of the School of Civil Engineering

F. H. Rhodes, Director of the School of Chemical and Metallurgical Engineering

W. R. Sears, Director of the Graduate School of Aeronautical Engineering

L. P. Smith, Director of the Department of Engineering Physics

William Littlewood

"The objects of this Society are to promote the welfare of the College of Engineering at Cornell University its graduates and former students and to establish a closer relationship between the college and the alumni."

President's Message

I was over at Letcher Bennett's (M.E. '24) house for dinner during the holiday season, and I asked Letch if his son expected to be an engineer. He presumed that Letcher, Jr., would enter engineering school because of his aptitude for mathematics and science, but added that the young man would probably go into general business on graduation. He pointed out that in doing this he would follow in his Dad's footsteps because Letch, Sr., never practiced professional engineering.

There are two philosophies regarding an engineering education: Those who assume college-trained engineers should preferably follow engineering as a profession; and those who emphasize the advantages of engineering as a method of mind training, in contrast to a classical education. I'm glad the latter concept has grown in popularity—as evidenced by the growth in the number of engineering colleges giving degrees in business administration; and also by the increased number of such courses contained in engineering curricula, at one time found exclusively in colleges of arts and sciences.

While a college education has certain cultural advantages, men seek higher education mainly because it can enhance their opportunity for business success. First and foremost, then,—engineers included—we are businessmen.

Many things contribute to business success; but, in a very general sense, two of its prime ingredients are straight-thinking and common sense. The latter may to a large extent be a God-given gift, but the former is the cornerstone on which an engineering education is laid. To some—the advertising fraternity, for instance—we engineers have this trait almost to a fault. Nevertheless, being trained to build step by step enables us to resolve major problems into component parts. That is exactly what the business executive does with his problems before common sense and experience, in the form of judgment, dictate his decisions.

I think Letch is doing the right thing for his boy. If my son is a chip off the old block he, too, will seek an engineering training; even though his business goal be as far removed from the practice of engineering as the old man's field of publishing and advertising.

ROBERT M. SMITH
(Pinch-hitting for Bill Littlewood)

Alumni News

Ennis R. Austin, B.S. in Arch. '86, retired after sixty years of architectural practice in New York City and South Bend, Ind., is now living near Osceola, Ind. He is the only architect in Indiana, outside of Indianapolis, listed in Who's Who In America.

Arthur N. Gibb, B.S. in Arch. '90, was unanimously elected an honorary member of the Ithaca Rotary Club this fall. A former mayor and alderman of Ithaca, he lives at 1022 Stewart Ave., Ithaca.

Ward Barnum, ME(EE) '93, joined Industrial Appraisal Co. of Memphis, Tenn., November 1, after thirty years with the Memphis Power & Light Co. His new address is 582 South Rembert Street, Memphis, Tenn.

Jonathan S. Burr, M.E. '93, is proprietor of a machine shop, John T. Burr and Son, Brooklyn. His home is also in Brooklyn, at 3201 Newkirk Ave.

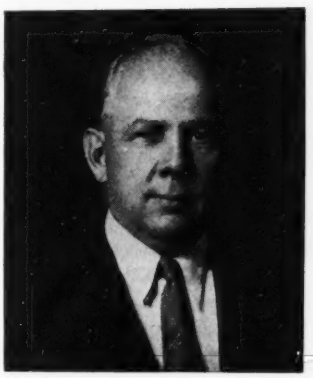
George M. Bacon, C.E. '93, retired civil engineer, lives at 700 South Royal St., Alexandria, Va.

Warren M. Craft, M.E. '93, and Mrs. Craft live at 60 Mount Airy Road, Bernardsville, N. J. Their children are **Harold D. Craft '31, Samuel A. Craft '36,** and **Warren M. Craft, Jr. '27.** Mr. Craft was a telephone engineer from 1895 until he retired in 1933.

Thomas R. Warriner, C.E. '93, is a consulting civil engineer in Cedar Rapids, Iowa, where he lives at 316 Forest Drive, SE. Two sons are also Cornellians, **Harwood Warriner, '26,** and **Robert R. Warriner '30.**

Frank H. Philbrick, M.E. '07, is the inventor of new power track maintenance machines now being manufactured by the Pullman-Standard Car Manufacturing Co. The equipment consists of separate machines to accomplish cribbing, ballasting, and ballast cleaning, with great savings in man-power.

Albert E. Frosch, C.E. '09, on leave from Sanderson and Porter, engineers, is serving as special consultant to the field director of ammunition plants of the Industrial Division, Ammunition Branch, US Army, which administers about thirty plants and installations scattered throughout the United States. He lives at 410 North Raynor Ave., Joliet, Ill.



Creed W. Fulton, M.E. '09, has been elected a vice-president and named manager of tne Trundle Engineering Company's New York office, located in the Graybar Building at 420 Lexington Avenue. Mr. Fulton, formerly president of the Cornell Society of Engineers, held the position of vice-president of the Samuel J. Creswell Iron Works in Philadelphia before he joined Trundle.

Raymond P. Heath, M.E. '11, is with March and McLennan, Inc., insurance brokers; he lives at 16 Jardine Road, Morristown, N. J.

George B. Cummings, B.Arch. '12, of 79 Front St., Binghamton, was recently appointed by Governor Dewey to a four year term on the newly-created New York State Building Code Commission.

Roger Bailey, B.Arch. '19, has been professor and head of the department of architecture at the University of Utah, Salt Lake City. In addition to his work as administrator and teacher, he is assisting on plans for expansion of the university.

The first meeting of the Chicago Chapter of the Cornell Society of Engineers on November 7 was quite definitely a success. After cocktails and a roast beef dinner, Tom McEwan, Temporary Chairman, began the meeting by citing some objectives of the Society and the aims of the Chicago Chapter. The temporary officers were elected to permanent positions (for one year). The officers are: **Thomas S. McEwan, M.E. '11,** Chairman; **Alfred H. Hutchinson, M.E. '09,** Vice-Chairman; **Newton C. Farrar,** Treasurer; and **John P. Gnaedinger, B.C.S. '47,** Secretary.

It was announced that at the meeting planned for January 16, **Fred Gillies '18** would speak. **William Littlewood, M.E. '16,** and **Fred H. Rhodes** were recommended as speakers for future meetings, which will be held on Monday nights. Speakers at this meeting were **John Farrar, '25,** president of the Cornell Club of Chicago, and **S. C. Hollister,** Dean of the College of Engineering. Dean Hollister's talk was descriptive of conditions at Cornell. 48 Cornellians, of which 26 were already members, turned out for the meeting.

Edwin F. Chobot, C.E. '21, last February started a business, Chattanooga Fabricators, for the sale and fabrication of structural steel after thirty years in the same line of business with other firms in Chattanooga, Tenn.

(Concluded on Page 38)

Profile - - -

Charles B. King

By LEONILDA ALTMAN, EP '51

Fifty-four years ago, a "horseless carriage" made its appearance for the first time in Detroit, the city which is now the automobile capital of the world. At the wheel sat a young man who had not only designed the engine of his machine himself but had helped supervise its construction otherwise. His name was Charles B. King, and today he stands as one of the nation's automotive pioneers, as well as one of Cornell's most distinguished alumni.

Charles B. King tells of his "Army boyhood," as he calls it, on the Wyoming frontier seventy-five years ago, where his father was on duty at various Army posts during the Cheyenne uprisings. This adventurous and rather risky life ended when, during Charles' fourteenth year, his family moved to Detroit after his father's retirement.

It was in 1886 that Charles B. King arrived in Ithaca to attend what was then Prof. Waite's private preparatory school, housed in what is now Cascadilla Hall, where the students lived as well as studied. After a year of preparation, he entered the Sibley School of Mechanical Engineering. In addition to his regular work, he found time to play the flute in the University Orchestra and the piccolo in the military band, as well as to do pen and ink illustrations for the year books. He is still remembered for the famous bell-ringing episode, part of a pre-arranged celebration in honor of Benjamin Harrison's victory in the election of 1888. At three a.m., Charles King and a friend of his entered the basement of McGraw Hall in order to climb to the bell tower. They had time to play "Far Above Cayuga's Waters" and other

Charles B. King

Cornell songs until, warned by a lookout, they beat a hasty retreat at the approach of the oncoming irate authorities. Although both were the subject of numerous "information wanted" placards posted both on campus and downtown, their identities remained a mystery for many years.

World's Fair Prizes

The untimely and unexpected death of his father forced Charles King to leave Cornell after having been a student here for only two years. His first job was with the Michigan Car Company at Detroit. His ingenuity soon manifested itself in a series of designs and inventions, and in 1893, at the Chicago World's Fair, his pneumatic hammer received the highest award of a bronze medal and diploma. Also on display was the King brake beam for railroad cars, and it was the sale of the patent for this invention that enabled him to organize the Charles B. King Company in Detroit to manufacture pneumatic hammers and marine engines.

In the ensuing years, King, in conjunction with such men as Ford and Haynes, helped write the history of the automobile age in America. He devised the first three-point suspension, integral motor and transmission assembly, the first running-board side steps, left-handed steering, and many other now-standard basic improvements. He worked with Henry Ford in producing the latter's first car, and he supplied some of the parts and assisted in the tests made. During World War I, he designed engines for some of America's first military aircraft. He was also a participant in the first automobile race held in America, about fifty years ago.

Artist, Author and Musician

Mr. King's versatility has gained him reknown in other fields as well, although he is not generally as well known for them. His success in the graphic arts and painting are attested to by the fact that his etchings, both in line and color, hang in the National Gallery, and he is also accomplished in oils and water colors. He is at home in the musical world as well, since he plays five instruments in addition to composing. He is the author of several books, and is at present engaged in writing his autobiography.

Mr. King now lives in Larchmont, N. Y., where he recently celebrated his eighty-first birthday. His home, Dolfincour, overlooking Long Island Sound, is of his own design and development. It is an excellent example of his ability as an architect (he is a member of the New York Architectural League), and, although designed twenty-nine years ago, has used material and design in the truly modern fashion.

Mr. King certainly embodies the Cornell ideal of the scientist combining the imaginative engineering approach with a well-rounded knowledge in other fields. His success in helping put America on wheels, as well as his many other accomplishments, make him a Cornell alumnus toward whom coming graduates can look for guidance and inspiration.

College News and Views

Engineering Council

The Student Engineering Council continues to widen its sphere of activities in a very gratifying fashion. The Council undertook the joint operation with the College of Engineering of putting Cornell on a less formal basis with interested pre-frosh. It is well known that too little has been done in the past to make the universities appear human to the high school students, invariably confused as to what they are looking for or are going to get in college. There is too much that is mechanistic about the whole approach to choosing the place for the four (or five) years of higher education. Therefore this step which was made just before Christmas of giving names of applicants and potential applicants for contact over vacation to about 200 men of the honorary engineering societies and the Engineering College Dean's List was certainly a good thing. Cornell should thereby have a distinct jump on its competitors when acceptance time comes in the spring, for the simple reason that it has acquired a personality by direct contract with the applicant. The project should certainly be repeated next year and possibly be extended to include the Spring vacation.

The Council's other baby, Engineers' Day, has been set for April 29, a date which coincides with the tentative Cornell Day, a day set aside for prospective students to visit and inspect the University prior to enrollment. The Engineers' Day, which was such a success last year when it entertained about 2,000 visitors, should provide very good public relations in this way. Work has already been started for this year's displays and will be in full swing very shortly. Any other student help available will be much appreciated by the Council.

Prof. Walter Jones

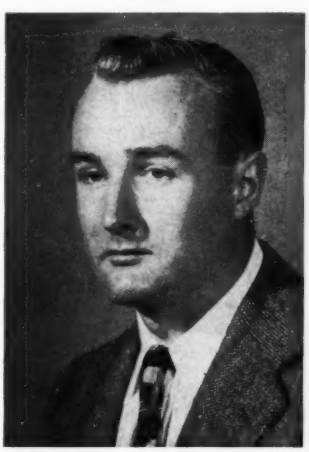
Professor Walter R. Jones of the School of Electrical Engineering at Cornell has been made technical director of the Television Technicians Lecture Bureau, which was formed recently to further education in the radio and television service industry. Professor Jones and other members of the bureau are giving a series of lectures in various cities thoughout the country.

Prominent Engineers

A talent for leadership can be spotted with little trouble. In the Engineering College, it is the spark-plugs of the societies, the "average-raisers," and the heavy contributors to the overall campus life who display this ability. More often than not, all three aspects may be found in one man—certainly, therefore, a man to be watched in the years after graduation. The ENGINEER commends four seniors who qualify under these considerations as active and interested Cornellians.

Bob Rustay, recently elected president of Tau Beta Pi, has been a credit to the EE school since his entrance in the fall of 1946, a veteran of three year's of South Pacific duty with the Navy. His work at present includes, in addition to the regular senior year curriculum, assisting in a research project under Professor McIlroy of the EE school, who is conducting a study of water flow and pumping through the use of similar electric circuits. His extra-curricular work, limited as it may be by the responsibility of a family (Bob married after his freshman year and is now the father of a small boy), has been of consistent calibre. As witness to the fact, consider his positions as president of Tau Bete, corresponding secretary of Eta Kappa Nu, and active member of the American Institute of Electrical Engineers. Bob plans at least a year of graduate work at Cornell, with the initial goal of obtaining a master's degree in his field.

Bob

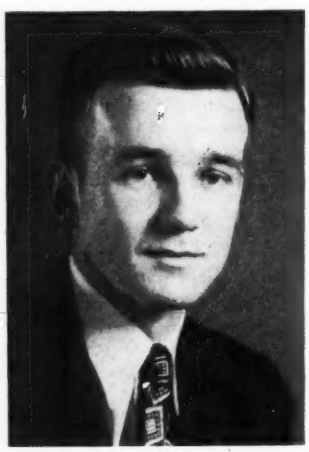


Jim

Well known beyond the confines of Sibley is **Jim Brandt**—campus leader extraordinary. A potential June graduate in mechanical engineering, Jim matriculated in the fall of 1946 after fourteen months with the Navy. During that time he has piled up an impressive list of extra-curricular activities: vice-president of CURW, assistant director at frosh camp, chairman of the 1948 Campus Chest Drive, house president of Chi Psi, and member of the JV baseball team, the cheerleading squad, Sphinx Head, Red Key and Atmos. His very evident ability at working with and lead-

ing people will hold him in very good stead in his projected work in the fields of industrial engineering and production.

Culminating his undergraduate career at Cornell as president of Pi Tau Sigma, **Dave Kennedy** may retrospect with satisfaction on years well spent in study and extra-curricular activity. A firm believer in the philosophy that an engineer is first a member of society and second an applied scientist, he has been able to strike a very good balance between these two primary aspects of life. In campus life, Dave has played varsity lacrosse (and, of course, wears a Cornell "C" or these efforts), has worked actively with the Newman Club, and has served as recording secretary of his fraternity—Delta Upsilon. His scholastic work has been of high calibre throughout, as evidenced by his memberships in Tau Beta Pi and Pi Tau Sigma and the freshman year award of a John McMullen Regional Scholarship. Engineering production is the field that attracts Dave particularly—and little wonder, for here he can work with people and still experience the satisfaction of creating with his technical knowledge.



Dave

Dick Elmendorf, too, has been a credit to the ME school and to Cornell University. Originally a ChemE at the time of his entrance in the fall of 1946, he transferred to his present department, after deciding that his work in the Navy had brought him to like even "grubby old aircraft engines." His four years at Cornell have been colored by many experiences and honors—all of which are sufficient

Dick

evidence of his outstanding ability and willingness to apply himself. In his own estimation, the three years of work with the 150-pound crew which culminated in helping to win the American Lightweight Championship in 1949 has been among his greatest experiences at Cornell. His musical contributions have included singing under Tom Tracy in both the Presbyterian Church Choir and the Cornell Men's Glee Club. The raft of Cornell honoraries can be counted on to recognize accomplishment and, in this case, Tau Beta Pi, Pi Tau Sigma, and Phi Kappa Phi have elected Dick to their ranks. The field of power engineering interests him as far as post-graduation plans are concerned, when he hopes to work with steam turbines or internal combustion engines.

Honorary Societies

Activities in the societies and honoraries that have come to the Engineer's attention includes the following:

Pi Tau Sigma—events of the concluding weeks of the fall term included the initiation of fifteen new members at a banquet at which emcee John Laibe introduced Professor P. F. Martinuzzi, who purposely spoke on a non-engineering subject—the relative merits of democracy and fascism. Later on, came a smoker held on January 14 for the graduating ME's and the faculty. In the spring, the organization plans to make an award to the undergraduate they consider the outstanding man in the ME school.

Pros-Ops — the new ChemE lounge will be dedicated this month after which the organization will have a banquet.

Cornell Metallurgical Society—because of the great interest shown by other engineers, notably ME's, the bylaws have been changed to include all engineers under the eligibility requirements.

Eta Kappa Nu — new officers elected in January are: Douglas Anderson, president; Robert Burns, vice-president; Theodore Holmes, publicity secretary; Robert Rustay, corresponding secretary; Albert Bishop, recording secretary; and Rocco Lapenta, treasurer. The annual course questionnaires were distributed to graduating seniors at the end of last term and will be distributed to other undergraduate EE's during the first weeks of this term.

Kappa Tau Chi—new initiates of the administrative engineering honorary are the following: David Cohoe, Philip Gottling, Donald Griffin, Howard Krasnow, Reino Merikallio, Eric Nulsen and Samuel Rogers. Course questionnaires were delivered to undergraduate ME's by Kappa Tau Chi during the last week of the fall term.

Pyramid—new officers of this CE honorary are John Coffin, president; Harvey Horick, vice-president; and Charles Dekyne, secretary.

Hedrick Appointed

Dr. J. Eldred Hedrick of New York City, senior technologist of the Shell Chemical Corporation, has been appointed a professor of chemical engineering at Cornell University, Acting President Cornelis W. de Kiewiet announced this summer.

(Concluded on Page 36)

Fingers of flame that pierce solid rock

YES, through a dramatic new process known as *jet-piercing* . . . holes can now be *burned* straight and true through solid rock! The harder the rock the more efficient the operation! A special combination of oxygen, fuel, and water does the job . . . and in a fraction of the time required by the old drill attack.

This process is of particular significance to the steel industry today. Why? Because government surveys show that America's reserves of top-grade iron ore—source of steel—are fast being reduced. But there remain almost inexhaustible beds of the once scorned low-grade iron ore called *taconite*.

The extremely hard and dense nature of taconite makes usual mining methods too costly and impractical. But the jet-piercing process—*with 1/10 the equipment and at a reasonable cost*—will burn holes straight into the solid taconite so that it can be blasted into lumps of usable size.

Also, destructive abrasion from the sharp-edged rock on loading and crushing equipment is being better controlled by machine parts made from extra-hard alloy steels. And to concentrate the iron content of the ore, new chemical processes can flush away much of the "waste" matter—thus leaving an ore 30% richer, for more efficient smelting.

The people of Union Carbide created the jet-piercing flame process as well as many of the alloys, chemicals, and other materials essential to today's mining efficiency. And UCC stands ready to help solve problems in other fields of American enterprise . . . wherever better basic materials and better processes are needed.

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E. E. RESEARCH

Wave Propagation Lab

By DAVID SCHERAGA, EE '54

Why fading and shifting on your television receiver, why this stuff called snow? The answer may well come out of research now being done in Cornell's EE school. The research department, under the guidance of Director Burrows and Research Supervisor Walter R. Jones, has put considerable time and effort into the solution of the various problems which arise in radio and radar wave propagation and, of course, the work has high priority in manpower, facilities and interest for the future.

Experimental work is being done in Franklin itself (although this fact

Equipment of the radio wave propagation lab in use as part of the EE school's research program.

may not seem immediately evident to some undergraduates who think of Franklin as a combination computing room and machinery lab) and also out near the Kline Road dorms, where researchers have taken over the former WHCU towers and have converted them to their purposes. An ionosphere recording set, which measures the ionosphere "bounce" characteristics under varied conditions, has been installed near these 165-foot towers and it is expected that results will be forthcoming to corroborate and explain some of the present theories and anomalies of wave propagation.

Television and radar wave propagation presents unique problems, mainly involving the reception of signals from transmitters from beyond the horizon. Dr. Henry G. Booker and William E. Gordon, both of the EE faculty, have developed some new theoretical explanations of the phenomena which have in some ways aided, and in other ways plagued television set owners.

Their theory grew out of the observation that radar waves, which are very short radio waves, do not travel in straight lines, but are often refracted, as light is, as they pass through media of different densities. In this way, it is possible for the wave to be sent back toward the earth instead of continuing out into space as would be expected. This phenomenon is called super-refraction, and its application to present-day methods of broadcasting is of the utmost importance.

Careful examination of experimental data in conjunction with climatic and weather conditions revealed two types of broadcasting phenomena. The first, and most important, super-refraction, occurs essentially in clear weather when the upper air is unusually warm and dry in comparison to the air at the surface of the earth. It is most noticeable at night when the temperature of the earth falls sharply and there is little or no change in the temperature of the upper atmosphere. Super-refraction, in its simplest form, involves an atmospheric wave guide, or radio duct, close to the earth's surface caused by variations in temperature and humidity of different air masses. The top of this duct is the level at which the downward curvature of a ray is equal to the curvature of

(*Concluded on Page* 30)

The Editor's COLUMN

Friendly Rivals

As one of a number of journalistic products flourishing on the Cornell campus, the ENGINEER has often observed with genuine interest the activities of its fellow publications. In general, Cornell publications all have similar problems at one time or another, and as a result, there is a feeling of mutual understanding between the various staffs.

However, we must admit that, in the case of the *Widow* and the *Sun*, our interest has often been accompanied by a certain amount of envy. For a tradition of rivalry between the "little old lady" and the daily has always had student attraction and, incidentally, benefited their publicity on the campus to some extent. Besides, it always looked like a great deal of fun to us. Imprisoned in its little rustic office on the top floor of Lincoln, the ENGINEER has gazed wistfully out upon the campus, jealously regarding the good fortune of others, since it has had no rival with whom to parley. Even the *Countryman* lives far enough away to prevent us from becoming its antagonist.

Amid the onrush of finals, however, there seems to have been a major change in the nature of the rivalry between the *Widow* and the *Sun*. The Mummy-Majura affair has caused both publications to accuse each other of atrocities committed in the reporting of the case. Personally, we feel that both have made a lot out of nothing. It is true that the *Sun's* treatment of the matter was a bit too pronounced, but the *Widow* acted just as much in bad taste when they so furiously blamed the *Sun* for its action.

At any rate, we want nothing to do with the matter, and the ENGINEER can now go back to its work, a little bit more contented to know that it doesn't have any such "friendly" rivals.

New RCA electron tube gives today's amazing computing machines an indispensable memory.

Tube with a memory *keeps answers on file*

So complex are present scientific studies—such as in atomic research—that working out the "arithmetic" could take all of our scientists' time.

Short cut through this drudgery is found in huge electronic computers, able to add or multiply numbers as large as a thousand billion in *millionths of a second.* But such speed is valueless unless—with comparable speed—the results of countless computations can be kept "on file" and taken out again.

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HONORARY SOCIETIES

By JOHN W. LAIBE, ME '51

The winning paper in the Fall 1949 Tau Beta Pi Essay Contest

The local situation in regard to honoraries, so called, has reached the condition that ones' status on the campus identifies itself with obscurity if he is not an active member of several organizations formed for the mutual appreciation and admiration of anything from hard liquor to the other members of the particular aggregation. No more suitable excuses for charters than the appreciation of living have been the avowed aims of no less than one of these clubs, and the net effect is that the term "honorary" has been reduced to a household, or campushold word implying not much more or less than a group of smiling people, smug in the realization that they are members of a select group from which vast numbers of other poor unfortunate humans have been excluded.

"Mutual Admiration Societies" dot the campus scene, and they pride themselves on the nebulous nature of their function, often breaking into the limelight by garrulous sorties of orgy proportions, designed, it seems, only to show how proper it is for the member of such an organization to depart from propriety. These outfits pack tremendous potentialities, and show signs of some action as the sleeping monster in their ranks stirs now and then to effect something in the right direction. Inertia is great, and precedent is in opposition to progress in any great proportions, however, so one can but hope and watch . . . and hope.

The zenith of futureless ranks in frantic double time on a crusade for the ideals of the organization is the well known drinking club. The aspirant thereto must exhibit remarkable ability to assume a blithe, indifferent attitude toward the ease with which he repeatedly makes an ass out of himself by unchaining his inhibitions with alcoholic solvents. This gay, blase air must never be lost even when exhibiting in the land the ostensible effects of mal de mer; one must shed the sheepish grin associated with the common aftermath, and hold the head high in proud defiance of the bigots who frown on the slightly carnal pleasures endorsed by the brothers.

Big Wheels

And so it is that the sot, the athlete, the hiker, the journalist (campus level), the freshman camper, the leaders of leadership conferences for leadership conference leaders, and the wheels of all magnitudes from gyroscope to mainstaff gather under proud little banners snapping smartly in the breeze stirred by cheers from within the ranks, and march bravely on. Though there may be scoffers lining the way, they know not the glory of having shingles on the dormitory wall, and will never taste the ecstatic joys of mutual admiration in large scale proportions. Have mercy on them.

What can stand among these ripples on the sea of local society and make waves? Who will show the way to forceful organization with a purpose; inspire underlings by its very existence, and show in a true light the woeful impotence of the groups claiming the name honorary? One powerful group, ideally, with strong national organization backing it, could, by rising above the bigotry and petty rah-rah, establish itself as the pattern for honoraries. It would necessarily be composed of men who lived and practiced the ideals of the organization twenty-four hours a day; who could stand as representative of the aims and goals for-

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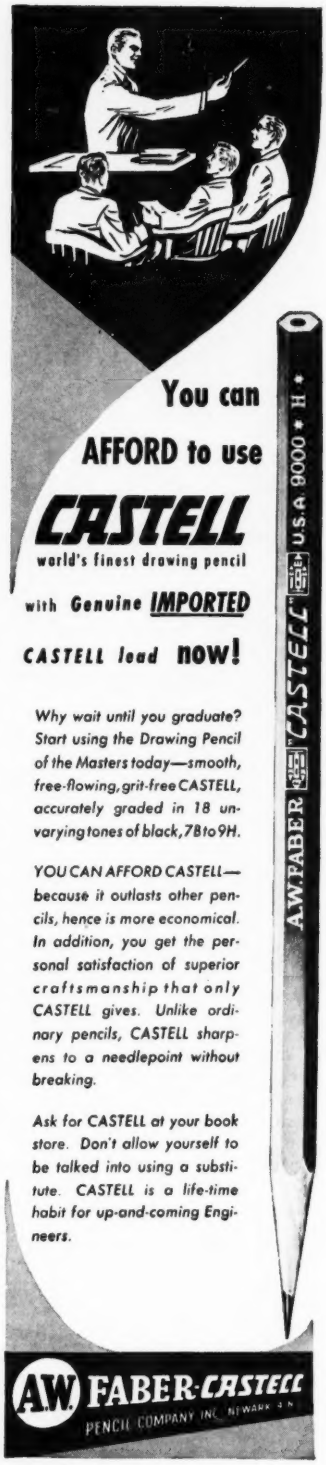
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A CENTURY OF CONFIDENCE

Techni-Briefs

Electronic Printing

New electronic devices that paint cars automatically—and even make the paint go around corners to coat the back side of parts—are being adopted in a growing number of automotive plants.

Automatic paint spraying equipment now is used in a number of plants for car roofs, hoods and other parts. The paint-spray gun moves up and down, and sideways, under control of a battery of electric eyes. Depth of the paint is regulated by electronic devices.

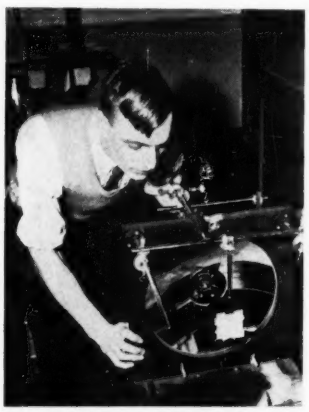
To make paint travel around corners and reach hidden surfaces, an "electrostatic" painting process is used. The car parts which are to be painted are passed through an electric grid, which is given a high-voltage negative charge. Paint sprayed into the space between the car paints and the grid is also given a negative charge, which makes the grid repel the paint and causes the car part to attract the paint. The system permits automatic control of the depth of the paint.

Another electrostatic process removes the last drops of excess paint which drain and collect at the bottom of the sprayed item. About 30 automotive and supplier firms now use the electrostatic process, on body parts, headlamps, horns, rubber floor mats, and other items.

Thermoradiography

A new method of making "heat radiation pictures" by photographing a glowing phosphor screen has been announced by Eastman Kodak Company.

The new technique, which is expected to have many uses in science and industry, is called "thermoradiography." It uses highly sensitive phosphors, which glow in the dark, to record the heat of objects over a wide range of temperatures. The difference in temperature between an object and its surrounding air record its image on the phosphor screen.



Heat radiation pictures may be taken with this new sensitive-phosphor type camera.

In a related technique, the sensitive phosphors are coated directly on an object to get a picture of its heat distribution. This use of the phosphors for direct measurement of heat is called "thermography." Thermography produces unusual temperature sensitivity.

By measuring the brightness of the phosphor, you can measure temperature at many points simultaneously.

Such a comprehensive picture of the heat distribution of an object, which can be recorded in still or motion pictures, has not hitherto been available to engineers and scientists. It is expected to have a variety of scientific applications.

Phosphors show a 20 per cent change in brightness with each Centigrade degree of change in temperature. Thermography can be used for temperatures ranging from that of liquid air to four or five hundred degrees Centigrade.

New Atomic Reactor

The experimental atomic power plant being built near West Mil-

(*Continued on Page 26*)

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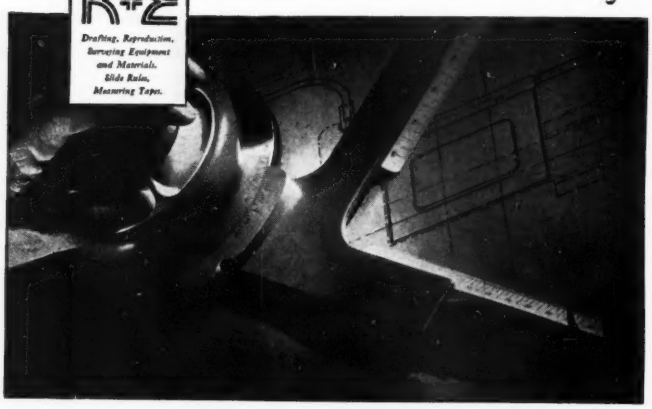

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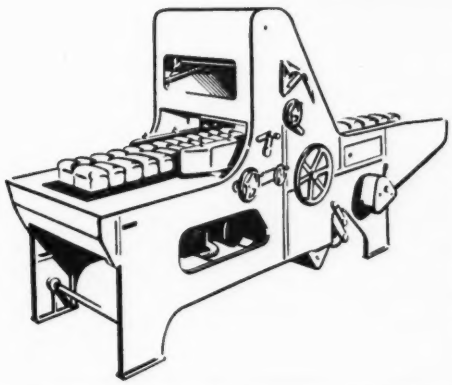

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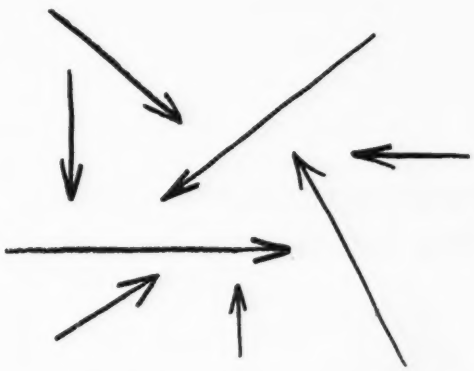

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Techni-Briefs

(Continued from Page 24)

ton, N.Y., will use liquid metal to transfer heat created by atomic fission to the heat exchanger, where steam will be produced to drive steam turbine generators.

Dr. Robert F. Bacher, formerly Professor of Physics at Cornell and the only physicist member of the Atomic Energy Commission, revealed that the reactor in the new plant will differ from most previous reactors in the higher energy of the neutrons — atom-splitting particles which are produced in it by the chain reaction in uranium.

Except for an experimental research reactor at the Los Alamos Laboratory in New Mexico which uses plutonium as a fuel, all other reactors slow down the neutrons until they have very low or "thermal" energies. The West Milton reactor will contain some reflecting material to reduce the neutron energy, but not enough to bring about thermal energies.

Dr. Bacher revealed that the West Milton reactor is one of four new types which are being built under AEC sponsorship.

Wind Tunnel

A 300 mile-per-hour blast of air can be generated in the powerful wind tunnel used for aeronautical research and testing at the University of Maryland's Glenn L. Martin School of Aeronautical Research.

The blast of air is generated by the 2250-horse-power electric drive system designed and built by the General Electric Company. Wind speeds from four to 300 miles an hour can be maintained accurately to within one-half of one per cent through a series of electronic controls.

The wind tunnel building is approximately 275 feet long, 125 feet wide. The tunnel itself has a working cross-section 7.75 by 11 feet.

The new tunnel will be used by students specializing in aeronautical research and for development and research work by aeronautical concerns and the government.

Electron Defraction

An instrument which uses a stream of electrons to study a layer of metal less than one quarter millionth of an inch thick is aiding engineers of the National Advisory Committee of Aeronautics in their search for better metals and lubricants for aircraft jet engines.

Developed by the General Electric Company, the "electron diffraction instrument" is used in determining the effects of various lubricants and in friction studies of polished metal engine parts. Ordinary lubricants are not adaptable to high speeds and temperatures inherent in jet engine operation, and new lubricants must be developed.

Natural films which emanate from the steel itself and chemical changes produced on the surfaces by lubricants, which are not visible under a microscope, can be detected in a few seconds with the instrument.

In operation of the instrument, electrons are emitted from a white-hot tungsten filament and focused

(Concluded on Page 28)

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Chemistry and southern fried ???????

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Dow's continuing research, along with that of other investigators, has proved that critical deficiencies of Methionine can be corrected by supplementing chicken feed with this amino acid, produced synthetically. Chickens fed fortified diets grew ten per cent faster and consumed less feed for every pound gained. Such new developments make it possible for poultry raisers to market better quality birds more frequently and more economically.

Experiments with amino acids and their importance in the nutrition of man and animal, are but a small part of the continuing research program in many fields which is carried on by Dow—in the interest of producing more "Chemicals Indispensable to Industry and Agriculture."

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Techni-Briefs

(*Continued from page 26*)

into a beam by a magnetic lens. The beam is then passed through a two-millionth-inch-thick section of metal and produces an image on a fluorescent screen or on a piece of ordinary photographic film. Both surface conditions and crystal arrangement can be determined from the image.

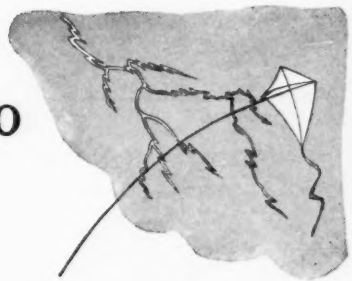
Bridge Control System

A powerful electric drive and control system, which raises a 1350-ton bridge span 100 feet in 105 seconds has been installed in the recently-opened Strickel Memorial Bridge, which crosses the Passaic River between Newark and Harrison, N. J. The bridge is owned and operated by the New Jersey State Highway Department. Power to raise and lower the 222-foot vertical lift span is supplied by two G-E 158-horsepower motors, each of which moves one side of the span.

To keep the span level while it is being raised or lowered, an amplidyne control system is employed. This quick-response leveling process begins as soon as one end of the span gets a fraction of an inch off level.

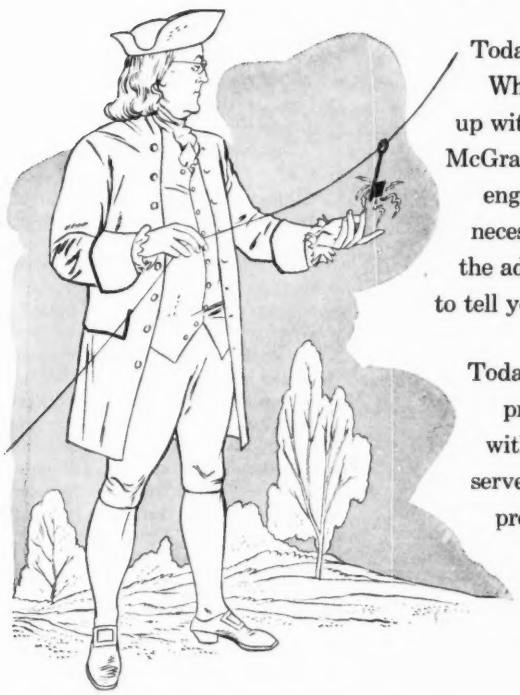
The control system provides a wide range of operating speeds at which the bridge can be moved. The huge span can be started slowly and speeded up during the middle of its lift, thus delaying motorists a minimum of time. Finally, an automatic speed regulator insures a smooth stop when the span reaches top or bottom.

What was the key to Ben Franklin's success?



It wasn't the one on the end of this kite string, you can be sure. The key to Franklin's basic contributions to the progress of science and engineering in America was his solid grounding in technical fundamentals. In America, the finest textbooks are available to everyone. They provide the indispensable background in technology that has made and keeps America great.

Many of the books in which you are now studying the fundamentals of your specialty bear the McGraw-Hill imprint. McGraw-Hill is the world's largest publisher of books for technical reference and instruction. as well as advanced research and study.



Today's discoveries are tomorrow's fundamentals. When you finish college, you will want to keep up with the latest advances in your field. Then, McGraw-Hill magazines and books for the practicing engineer will report to you on all that is new, necessary and important. And you'll depend on the advertising pages of McGraw-Hill publications to tell you where the latest equipment is available.

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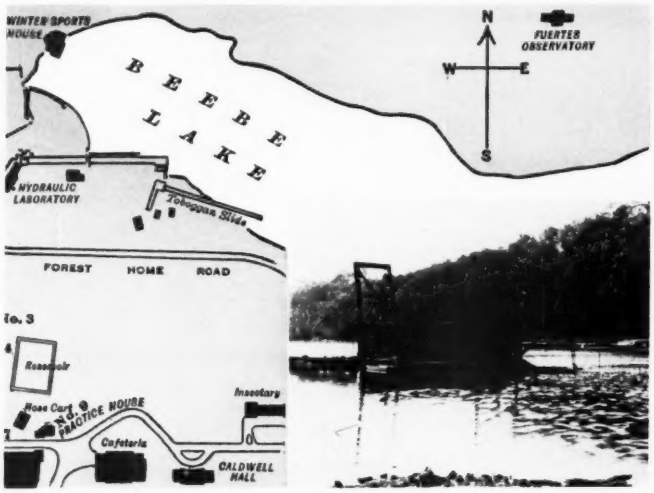


CLASS OF '30 remembers

this MORRIS lesson in engineering

Problem: To dredge Beebe Lake which had become unsightly with sand, silt and sediment — material which had been accumulating since the building of the dam.

Answer: Found in the *Morris Dredge No. 100.* A Morris Built 10" portable Electrically Operated Hydraulic Cutter Dredge, with a steel hull of two easily dismantled pontoons. Each pontoon measured 9 ft. wide by 45 ft. long by 5 ft deep. Dredge equipped with a Morris 10" heavy duty manganese steel lined dredge pump driven by a 250 H.P. 600 RPM motor.

She proved capable of digging 15 ft. below water level and discharging through 1600 ft. of ten inch pipe line. She was sold with the understanding that capacity would equal 90 cu. yds. per hour. Actually she delivered far in excess of this amount. In all, the dredge removed almost 125,000 yards of material.

An old story this — but a typical example of a Morris engineered product in action. . . . And an important milestone for Cornell, too. The successful work of the Morris Dredge No. 100 in the removal of this eyesore in Beebe Lake resulted in greatly improving the appearance of the campus and the whole university setting.

John C. Meyers, Jr.
E. E. '44
Executive Vice-President

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Sales Offices in Principal Cities

MORRIS *Centrifugal Pumps*

Wave Lab

(*Contniued from Page* 20)

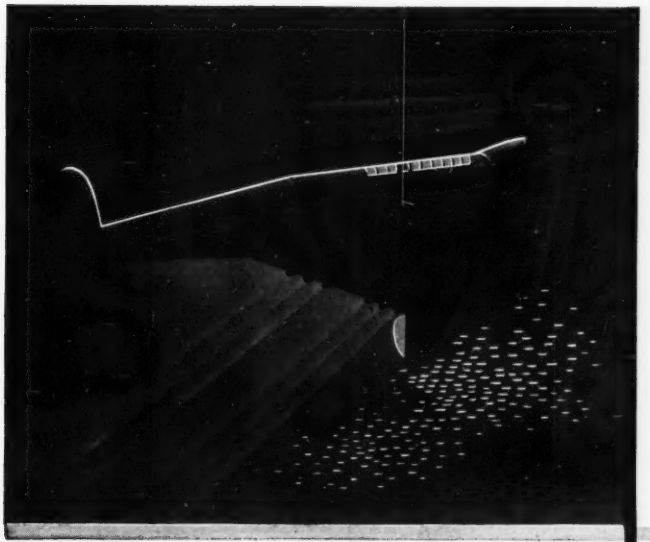
the earth. In simple cases the radio duct extends from this level down to the surface of the earth. If a transmitter is located below the top of the duct, the ray emanating horizontally is bent downwards to such an extent that it suffers successive reflections with the earth. The ray is, in reality, trapped within the duct. It is this "trapping" which enables low level radar to see targets far behind the geometric horizon.

Theoretical calculations of the effects of this duct were made by Dr. Booker during the war. He devised an index of refraction of television signals which is roughly similar to that which measures the refraction of light rays as they pass from one medium to another.

In general, orthodox propagation is associated with poor weather, whereas super-refraction is connected with clear weather. This may be easily seen since the lower atmosphere is usually stirred up in stormy or rainy weather. Consequently there is no sharp variation in the density of the air masses, and therefore no appreciable downward bending of the rays.

The second phenomenon associated with the propogation of television and radar waves is based on the assumption that the atmosphere is not uniform in composition, but is made up of numerous small masses of air which have slightly different moisture content. When video signals pass through the small masses, a small amount of their energy is thrown off its course and scattered in all directions. As a result, some of the energy will be bent downward and find its way to receiving antennae situated far beyond the horizon. With the aid of "boosters", the signal may be amplified to provide an image on the television screen.

Although they have secured the experimental data necessary to support their theory, Dr. Booker and Mr. Gordon plan to continue their investigation into radio meteorology in the hope of uncovering more material which will improve, to an even greater extent, television and radar reception as we know it today.



Moving faster!

Efficiency in many mechanical devices is often a matter of high speeds and low weight. The resultant stresses make heavy demands on parts, whether they be in aircraft or automotive engines, machine tools or locomotives.

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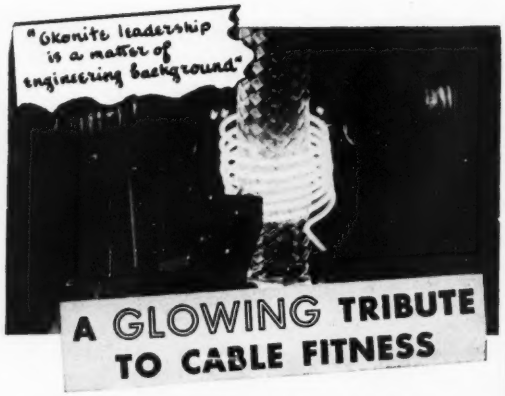

A GLOWING TRIBUTE TO CABLE FITNESS

Is a cable covering flameproof? Will it resist high temperatures when it comes to actual service?

Long before a cable is manufactured, questions like these are answered in the Okonite laboratories, proving ground and in various testing departments of the Okonite plants. The picture above shows a flame test. The measured current that makes the coils glow makes it possible to reproduce test after test without variation. The Okonite Company, Passaic, New Jersey.

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Printing Co.

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OUR NEW TELEPHONE NUMBER

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History of "Engineer"

(*Continued from Page* 13)

1933. So in November, 1933, Elmer B. Isaak, editor of the *Civil Engineer,* went to a *Journal* board meeting to discuss the possibility of a merger. Evidently, action on such a proposal did not follow, and both boards found themselves facing another year of independent publication the following fall.

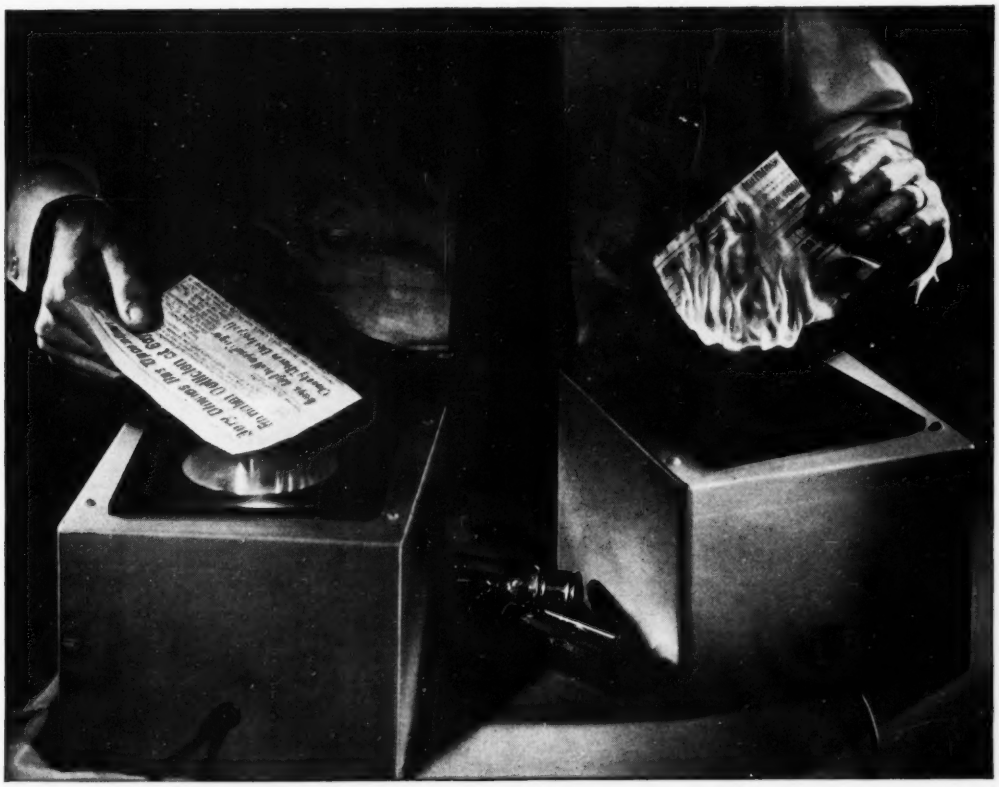
The Merger

Luckily, business prospects began to improve in 1934; yet both boards continued to show their willingness for a merger, and in November the *Journal* asked Professor Diederichs to take the matter up with Professor Hollister, newly-appointed head of the Civil Engineering School at that time. Through the effort of these two faculty members and both boards, concrete arrangements were finally made for the merger, resolutions were passed by both of the retiring boards, and finally on March 18, 1935, a combined meeting was held of the Cornell Civil Engineer Association and the directors of the Sibley Journal of Engineering, Inc. Here the merger resolutions were adopted, and the two magazines became one.

In Conclusion

So ends the history of these two Cornell publications and now their pages serve only to reveal an interesting record of the past. From the old *Crank* of 1887 we may learn that the civil engineers are elated over the appropriation for a new building (Lincoln Hall) for their use, "to be situated on the north sideof the road leading east from the Signal Station, facing Sibley College, thus forming with the existing buildings a quadrangle, the conventional and time-honored plan for the campus of a University." Or if we scan the *Sibley Journal* of 1897, a note is discovered that informs the Sibley students of a lecture here by Charles P. Steinmetz, "chief electrician" of the General Electric Company. As to the liquor problem, the *Civil Engineer* of 1913 reports that "a feature of the recent class elections was the agitation of the liquor question. It is interesting to note that there is a growing tendency against the 'wet' class functions." In 1921, when Cornell manages to beat Western Reserve in football by the score of 110 to 0, the *Civil Engineer* can only say that "the contest developed into a track meet shortly after the blowing of the first whistle."

As Dexter S. Kimball wrote in the inaugural issue of the CORNELL ENGINEER in October, 1935, "one naturally regrets the passing of old friends such as the *Cornell Civil Engineer* and the *Sibley Journal,* both of which have added lustre to the history of engineering at Cornell. But time brings changes and new needs, and it has long been recognized that a consolidated journal will not only be more economical but can be made to represent the work of the consolidated college better than the two older magazines. Here as elsewhere, in union there is strength."



Glass that picks fire out of a light beam

The electric lamps you see between the boxes on the table are exactly alike—they generate both powerful light *and* intense heat.

If you should concentrate the beam of one of them with a reflector and plug it into an ordinary socket, you'd be practically blinded by its glare and your clothes scorched by the heat—unless you turned away fast!

But look what happens when you put them into the fixtures in the foreground, so their beams are covered by two different kinds of Corning glass.

The beam from the bulb on the left is cooled down so sharply that you can hold a wisp of newspaper in it for hours without its catching fire. Yet the light is almost as dazzling as ever.

Notice now that no light apparently shines from the bulb in the fixture on the right. But if you hold a piece of newspaper over it—in a matter of seconds you have fire in your hands!

The explanation is: One of the glass plates transmits the comparatively cool, visible rays generated by the bulb, blocking off most of the invisible heat rays. The other allows only the invisible heat rays to pass.

These pieces of glass are only two of the dozens of ray-transmitting or ray-blocking glasses that Corning makes—glasses that can pick out any segment of the light spectrum and put it where it's needed.

For example, a lamp shielded with a Corning glass which transmits *only* near ultraviolet rays lights automobile instrument panels without glare. Another kind of Corning glass transmits only invisible infrared rays and is used in electronically controlled burglar alarm systems.

Throughout industry, *Corning means research in glass*—and these ray-blocking, ray-transmitting glasses represent only one of a multitude of outstanding developments that have earned Corning this reputation.

We hope you'll keep in mind that Corning research and technical skill have made glass one of the most versatile engineering materials there is.

For when you're out of school and are concerned with product and process planning, you'll find it to your advantage to call on Corning before your plans reach the blueprint stage. *Corning Glass Works, Corning, New York.*

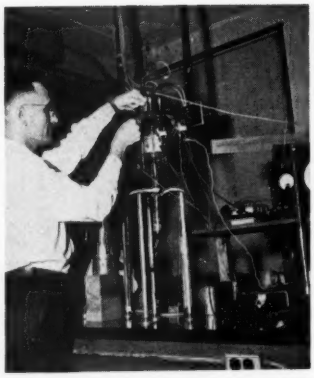
CORNING
means research in glass

Industrial Electronics

(*Continued from Page 9*)

Heating by high power circuits operating at high a.c. frequencies is common. These circuits generally use large, high vacuum tubes in oscillating circuits. For induction heating the metal to be heated is placed within a coil carrying a large current. An induced current flows in the metal and heats it. This makes it possible to heat treat local areas or to produce unusual parts accurately and quickly by soldering or brazing where it had previously been impossible to produce such parts at a reasonable cost.

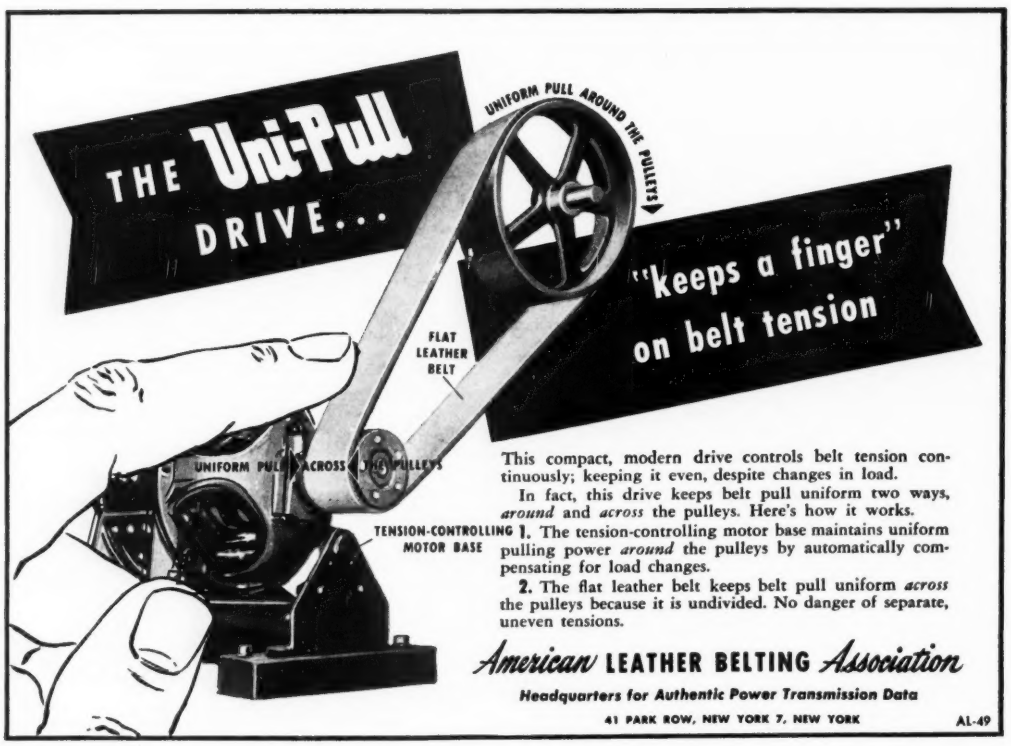
In another type of high frequency heating the non-conducting material to be heated is placed between two metal plates so that it acts as the dielectric in a condenser. When this condenser is connected to the high frequency circuit the rapid reversal of the electric field between the metal plates causes the molecules, of which the non-conducting material is composed, to twist back and forth and heats the material by its own internal friction.



A early model electronic motor control panel.

Electronic precipitators remove dust from the air for air conditioned rooms. The dust particles are charged by an electric field and then collected on charged metal plates as the air passes thru. Hayfever sufferers may use such a precipitator to remove the flower pollens from the air as they are admitted to a room.

Just as it is impossible to enumerate the many uses of available electronic devices it is also impossible to even visualize the innumerable uses which the future will make of these and other "yet to be developed" pieces of equipment. For this reason the student in the Industrial Electronics Laboratory puts together, takes apart, and studies the component parts of available equipment. He is called upon to use as much as possible of his engineering training to understand how the complete unit works as well as how each part functions, in order that he may be able to handle future electronic problems intelligently and economically.


THE Uni-Pull DRIVE...
UNIFORM PULL AROUND THE PULLEYS
"keeps a finger" on belt tension
FLAT LEATHER BELT
UNIFORM PULL ACROSS THE PULLEYS
TENSION-CONTROLLING MOTOR BASE
This compact, modern drive controls belt tension continuously; keeping it even, despite changes in load.
In fact, this drive keeps belt pull uniform two ways, *around* and *across* the pulleys. Here's how it works.
1. The tension-controlling motor base maintains uniform pulling power *around* the pulleys by automatically compensating for load changes.
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TWO MORE FRICK-FREEZERS FOR DEL-MAR-VA

Shoreland Freezers Operate Their Tunnel at 40 Degrees Below Zero

Two big poultry freezing plants, equipped with Frick Refrigeration, were built at Salisbury and Pocomoke City, on Maryland's "Eastern Shore," in 1946.

Now Shoreland Freezers, Inc., also at Salisbury, and the Draper Canning Co., at Milton, Del., have Frick-Freezing tunnels handling fruits and vegetables.

The Shoreland tunnel is 45 ft. long, the other 60 ft.; each is equipped with both push trucks and a conveyor belt, and will handle ANY foods.

Not far away, at Bridgeton, N. J., Frick Refrigeration carries the cooling load in the world's largest quick-freezing plant.

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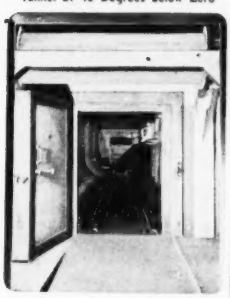
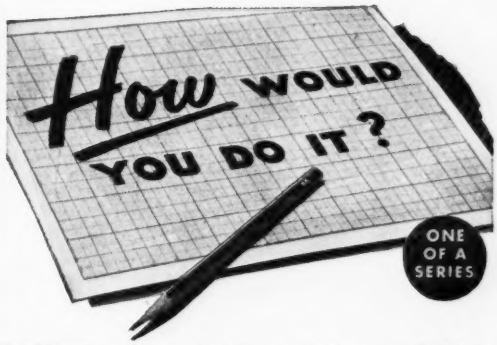


The Sixty Foot Tunnel at the Draper Canning Co.; Conveyor Belt is Above Push Trucks

Two of Three Frick Compressors at the Draper Canning Co.



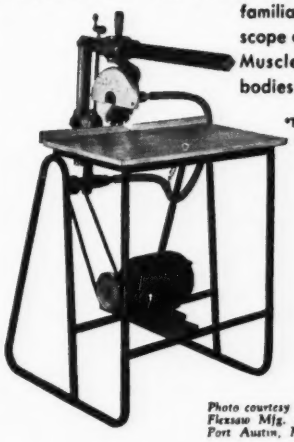
PROBLEM — You are designing a circular saw. The blade must have horizontal, vertical, and angular adjustments. Your problem is to work out a drive for the blade that permits this three-way adjustment. How would you do it?

THE SIMPLE ANSWER — Use an S.S.White flexible shaft to bring power from the counter-shaft or motor to the blade. There is no simpler mechanical means than a flexible shaft for driving parts which must be adjustable. And simplicity in design means economy in production.

* * *

This is just one of hundreds of remote control and power drive problems to which S.S.White flexible shafts provide a simple answer. That's why every engineer should be familiar with the range and scope of these tireless "Metal Muscles"* for mechanical bodies.

*Trademark Reg. U. S. Pat. Off. and elsewhere



Here's one prominent manufacturer's solution to this problem.

Photo courtesy of Flexsaw Mfg. Co. Port Austin, Michigan

WRITE FOR BULLETIN 4501

It gives essential facts and engineering data about flexible shafts and their application. A copy is yours free for asking. Write today.

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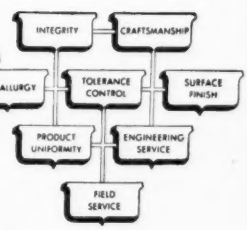
8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY



SKF builds extra stamina in every bearing labeled SKF. Unseen but vital plus-factors have enabled SKF Bearings to set new records for efficiency and durability. For SKF concentrates on not *one* but *eight* factors for superiority. SKF IND., INC., PHILA. 32, PA.

SKF
BALL AND ROLLER BEARINGS

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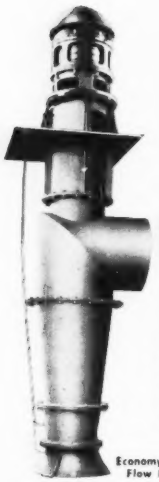
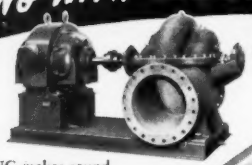


Economy Non-Clogging Sewage Pump



Economy Double Suction Pump

ECONOMY PUMPING makes sound sense to engineers who know the dollars and cents value of trouble-free pumping service. To pump longer, at lower cost, with less maintenance, rely on Economy Pumps.

Centrifugal, axial, and mixed flow pumps for all applications.

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Economy Axial Flow Pump

Economy Pumps, Inc.
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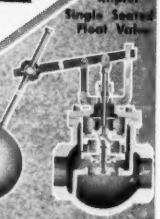
ACCURATE, DEPENDABLE REGULATION



Klipfel Single Seated Float Valve

CLOSER REGULATION . . . more accurate control . . . that's been the forty year service record of Klipfel Automatic Regulating Valves on installations throughout the land.

Klipfel exclusive design inner valves assure better closing, more dependable regulation.

Complete line includes pressure reducing valves, float and lever valves, thermostatic valves, back pressure and relief valves and pump governors.

Klipfel Ball Type Reducing Valve

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Paul O. Reyneau '13, Manager

College News

(*Continued from Page* 18)

Dr. Hedrick has been with the Shell organization since 1941. He has been a supervisor of both small-scale and commercial plant operations and has helped design synthetic rubber, aviation gasoline, and chemical plants. In his present position, which he has held since 1945, he has been a member of the Economic Research Department of Shell Chemical Corporation where he has been engaged in planning activities and technical-economic evaluations for the Shell Chemical management. During the war he served as a consultant to the War Production Board on ways and means of increasing the production of essential chemicals.

A native of Meredosia, Ill., he is a graduate of Illinois College in the class of 1931 and has the degrees of master of science and doctor of philosophy from the University of Iowa. He served with the Iowa Department of Public Health in 1934-36 and was an instructor in chemical engineering at Kansas State College, and supervisor of research in chemical engineering in the college's engineering experiment station from 1936-41. He has also taught at Purdue University and has been a consultant to industrial concerns on fuel and lubricant problems.

Dr. Hedrick is a member of the American Institute of Chemical Engineers, the American Chemical Society, Sigma Xi, Alpha Chi Sigma and Phi Lambda Upsilon.

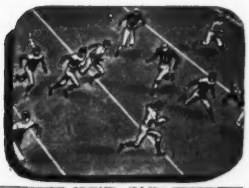
Honorary Societies

(*Continued from Page* 22)

warded by this super honorary, and do so before anyone. This answer to the deplorable degeneration of the term *honorary* would set the pattern for a new rebirth of enthusiasm in study, for campus affairs, and for personal development. It would pull the wagon itself for a while, but in the end, it would be at the wheel, for distinction would come the slowest in a reversal of form, but it would be much more significant when the turn came. The organization that summons the courage to tackle the job, packs the talent and ability to put it across, and uses the tact to sell itself will rise as the giant of its specie.

This could be your fraternity.

Will it?



Plastics where plastics belong

for high dielectric and structural strength, light weight and ease of machining

In the RCA television camera, for example, Synthane was selected for coil forms, tubes, flanges and other components because of its electrical insulating properties, especially at high frequencies and high voltages. Its ease of machining, light weight and structural strength were other factors that led RCA's design engineers to select Synthane as the best possible material for this job.

Synthane, laminated phenolic plastic, is at its best in applications requiring unusual *combinations* of characteristics. Its excellent electrical insulating ability, combined with ease of machining, light weight, rigidity and many other properties, such as moisture and corrosion resistance, make Synthane a valuable material for many industries.

Synthane Corporation, 1 River Road, Oaks, Pennsylvania

SYNTHANE

where Synthane belongs

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NE has everything

. . . in electrical roughing-in materials

National Electric has a *complete* line of wires, cable, conduit, raceways and fittings for every wiring need.

Just remember—when you get in a spot where you need something good (electrically speaking) but fast—the wholesaler who handles National Electric products is your safest bet.

National Electric
PRODUCTS CORPORATION
PITTSBURGH 30, PA.

WE WANT TO BUY YOUR USED TEXTBOOKS!

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IN CASH!
Bring them in right away.

If you sell your used books to the Co-op, you get the use of a $5.00 book for one or two terms for only $2.00; a $4.00 book for $1.60; a $3.00 book for $1.20 and so on. Let us show you how it's done.

THE CORNELL CO-OP

Barnes Hall — On The Campus

Alumni News

(*Continced from Page* 15)

Daniel M. Coppin, C.E. '26, of 6410 Fair Oaks Ave., Cincinnati 13, Ohio, is secretary-treasurer of the Fisher DeVore Construction Co.

J. Ward Simonson, ME '39, left Lucidal Division, Novadel-Agene Corp., Buffalo, N. Y., to join the engineering staff at O-Cel-O, Inc., Buffalo, manufacturers of cellulose sponges.

Baird T. Bauder, M.E. '40, is a time study and methods engineer with Motorola, Inc., in Chicago, Ill. He and Mrs. Bauder live at 2703 Elder Lane, Franklin Park, Ill.

William Dixon, ME '40, is a mechanical engineer with The Singer Manufacturing Co., manufacturers of sewing machines, Elizabethport, N. J.

Porter W. Gifford, Jr., BS in AE(ME) '41, is superintendent of a blast furnace slag crusher, Gifford-Hill & Co., Inc., Daingerfield, Tex.

Raymond W. Kruse, BE in AE(EE) '41, resigned from the Sharples Corp. to join the plastics sales department of Rohm & Haas Co., Philadelphia, Pa.

After returning home from the Engineers, Shanghai Port Command, in July, 1946, **James P. Beardsley, BArch '43,** again went to work for his architect-father, **Wallace P. Beardsley, BArch '19.** The firm became Beardsley & Beardsley, architects, in November 1948, upon the fiftieth anniversary of its founding in 1898 by the late **Samuel E. Hillger '84,** who supervised the University Library Construction for the architect. **Wallace P. Beardsley, Jr., BArch '49,** graduated from Cornell last June.

Gordon K. Dingle, B.M.E. '47, of 7 Westwood Drive, Washington, D.C. is an air-conditioning engineer with York Refrigeration Co.

James Gillin, Jr., B.Chem.E. '47, has joined the research and development division of Merck and Company of Rahway, N. J. as a chemical engineer.

What Does Industry Expect

(*Continued from Page* 7)

was no set method of control and that sales hadn't been checked against shipments in some time. He made his own survey of sales to see whether they were proportionate to shipments. Shortly afterward he had his first break when a vice-president of the company visited the store to discuss their method of packaged shipments. He and the store manager decided that collecting the necessary data would be a good job for the new trainee, so they sent for him to outline his new duty. When the trainee was able to say, "I thought you would want this information so I have it compiled already," his future was assured. This man was able to anticipate what was needed, and what is more important, he acted rather than day dreamed. His story did not end with a single spectacular deed; he continued to stay about three jumps ahead of his associates.

I hope that these paragraphs will be stimulating; but for the best advice refer to the inscription on the head of a penny.

THE DU PONT DIGEST

FOR STUDENTS OF SCIENCE AND ENGINEERING

BAD MEDICINE *for flies*

Research that produced an insecticide safe to spray on cows may save millions for American agriculture

Armed with only a fly-swatter, the farmer would get nowhere in ridding his dairy barn of disease-carrying insect pests. But he has to be careful in using insecticides around cows. A toxic spray may be absorbed through the animal's skin and show up in meat, milk and butter.

Next fly-season farmers and ranchers will be able to buy a fly-killer that is both powerful and safe. In Du Pont Marlate* 50% technical methoxychlor insecticide they will get this combination of properties that no single insecticide has ever offered before.

Methoxychlor is a recent Du Pont development. Du Pont scientists worked for eight years in the laboratory and in the field to develop its applications in agriculture.

THE BITES *of flies, lice, and ticks can cut down milk production as much as 20 per cent. One spraying of "Marlate" 50 will control these pests for several weeks.*

A safer insecticide

"Marlate" 50 is a residual insecticide and remains an effective killer of flies, mosquitoes, fleas and lice for several weeks after application. When used as directed, this insecticide is exceptionally safe to human beings, livestock, pets and crops. This has led federal experts to recommend it not only for spraying in barns, milk houses and milk plants, but also on the animals themselves.

Besides its use on livestock, methoxychlor kills many insects that attack vegetables, fruits and forage crops. It is offered to flower growers as an ingredient in Du Pont Floral Dust. It is used in moth-proofing compounds so that dry cleaners can easily moth-proof woolens while cleaning them. Many stores carry aerosol bombs containing methoxychlor for household use. It can be used with safety in flour mills, freezing and canning plants, grain storage elevators, cereal manufacturing plants—wherever food is processed. This development of research can bring immediate cash savings of millions of dollars to American agriculture, industry and homes.

The long fight

Exciting as the future of "Marlate" 50 appears, this does not mean that the use of other insecticides will not continue. Each has its special characteristics, and each has special uses for which it is outstanding. There are at least 10,000 kinds of insect pests, of more or less importance, in North America, and there can be no let-up in the scientific fight being waged against them.

Du Pont alone now makes over fifty different insecticides. The knowledge gained in making each one speeds the development of the next. By backing ideas with funds and facilities, Du Pont helps the farmer put more and better food on the American table. At the same time, in many other fields, Du Pont is helping to raise the American standard of living with continuous research aimed at developing new products and improving present ones.

*REG. U. S. PAT. OFF.

"MARLATE" *50 kills flies and many other insects attacking livestock, vegetables, fruits and forage crops.*

SEND FOR "Chemistry and the Farmer," an interesting, informative booklet on the development of pest control, etc. 34 pages. For your free copy, write to the Du Pont Company, 2503 Nemours Building, Wilmington, Del.

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BETTER THINGS FOR BETTER LIVING

...THROUGH CHEMISTRY

Great Dramatic Entertainment—Tune in "Cavalcade of America" Tuesday Nights, NBC Coast to Coast

STRESS and STRAIN...

Under a dimming 40 watt,
This tired M.E. sits.
He sits and sits and sits
And sits and sits and sits.
This grind a weary man is he,
With weak and slimey hands.
And the muscles of his scrawny arms,
Are strong as rubber bands.
His brain is shot and hardly there,
His face is turning green.
His lips are wet, he smells of sweat,
His condition is obscene.
Week in, week out, from morn 'til night
You can see his hunched up form,
You can hear him moan and sing the blues,
But you can't make the wreck perform.
So let's leave this poor M.E. alone
'Til June is here and then,
His mind is cleared of lab reports
And school is out again

* * *

"Well, we'll have to rehearse that again," remarked the undertaker as the coffin fell out of the back end of the truck.

* * *

Curious fly,
Vinegar jug,
Slippery edge,
Pickled bug.

* * *

Smith: "Robinson, the banker, has stolen $100,000 of the funds and ran away with the hotel keeper's wife."

Smythe: "Heavens! Who will teach his Sunday School class?"

* * *

"So you bought a home in the country?"

"Yes, five rooms and a path."

* * *

Economics: Girls without principle can draw considerable interest.

John: "What are those marks on your nose?"

Bill: "Oh, they are made by glasses."

John: "You should learn to tilt your head back further, so it would pour out easier."

* * *

Engineering vs. Arts

As one demonstration of the difference in attitudes between the Engineering and Arts schools, we've selected a number of conversations between the profs and the students. These are, of course, intended to show a certain superiority of one over the other, and we guarantee that you-know-who will come out the better.

As evidence of the practicality of all they do, the engineers have spawned these:

CE Prof: "Describe the mechanism of a steam shovel."

Student: "Don't kid me, you can't shovel steam."

A practical fellow, and not to be fooled by the devious gambits often taken up by the Arts school to befuddle its ready-to-be-befuddled-students. Where else could one find gems as these, except there:

"Too bad about the disappearance of Professor Smith. He was a profound thinker."

"Yes, he was always thinking, no matter where he was. The last time I saw him he was in swimming, and he suddenly called out, "I'm thinking, I'm thinking!"

"You fool! Professor Smith spoke with a lisp!"

Another example:

Prof: "Are you teaching this class?"

Student: "No."

Prof: "Well then sit down and stop acting like an idiot."

Still another:

Prof: (to class) "There's a young man in this class who's making a jackass of himself. When he is finished, I'll start."

As for conversations between representative segments of the two, what could be easier to expect, and to find, than a great display of wit and wisdom on the favored side, and the lack of it (to say the least) on the opponent's.

We can imagine a English prof saying to his class, in tones like a dove,

"I speak the language of the trees, the forests, the lakes, and the brooks." And the wise engineer, who always stays indoors, to avoid the danger of breathing undiluted fresh air, leaning back in his seat, perhaps ruminating over his last trip into the Great Outdoors, saying, "Next time you see a skunk, ask him what the hell's the idea."

Of course, it isn't only the profs the engineers have their troubles with. There are the Arts students themselves, who begin to act like their profs, in misguided notions of emulation.

Arts Student to Engineer: "Perhaps you too are a lover of nature. Have you seen the golden fingers of the dawn spreading across the eastern sky, the red-stained, sulphurous islets floating in the ladle of fire in the west, the ragged clouds at midnight, stealing over, blotting out the shuddering moon?"

Engineer to Arts Student: "Nope, not lately. I've been on the wagon for a year."

Now for a change in setting. The scene is in an obscure building at one end of the campus. It is the sleepy time of the time. The formulas, constants and figures flow on in a dreamy sequence, eddying in tight little curls, and finally falling to the floor to be tripped on by the sleepers, when they awake. But there, in the second row, is an unfortunate fellow who cannot restrain one tremendous yawn. And out it comes. And when it does, his outstretched arm catches his neighbor squarely under the chin, knocking him to the floor. Horrified, our poor hero bends over his recumbent pal, just in time to hear this low murmur: "Hit me again, Sam, I can still hear him."

Photography can make this page

this small

IT'S DONE WITH MICROFILM MAGIC

TINY AS IT IS, the little rectangle above is this page in black and white—as it appears on microfilm. Everything there, condensed to a mere spot, but ready to be brought back full size with all its features intact. For photography can reduce tremendously without losing a detail.

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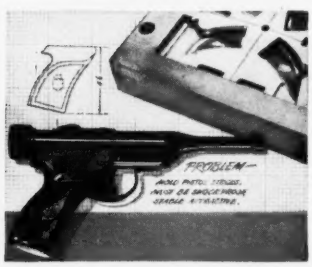
. . . a great name in research with a big future in CHEMISTRY

PLASTICS—A MULTIMILLION-DOLLAR INDUSTRY AND STILL GROWING

"Plastics" to most people connotes something modern—something new. And the plastics industry, as it now exists, is still an infant, but a lusty and vigorous one.

How fast it has grown in a short span of years is indicated by these figures, which show the number of plastics molding plants in the United States in the last thirty-nine years:

1910	8 plants
1920	63 plants
1930	172 plants
1940	575 plants
1949	1,160 plants (estimated)



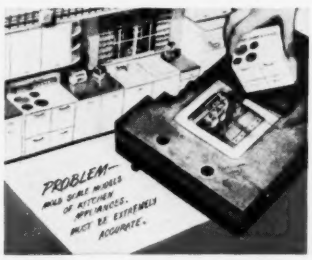
The Ancients Molded Plastics

But the art of casting "plastic" material in molds is an old one. As long ago as King Solomon's time, asphalts and mineral tars were being molded into useful shapes.

These natural molding materials were the only ones available for centuries—until the invention, in 1869, of the first modern synthetic plastic, celluloid. Today the plastics industry makes dozens of synthetic materials with a wide range of molding characteristics.

General Electric entered the plastics business more than fifty years ago by molding carbon rods for arc lamps from clay and lampblack. Later, G. E.'s plastics operations expanded rapidly, when plastics began to be used extensively in electrical insulation.

As General Electric's plastics operations grew, it became practical to offer plastics services to other companies.



Now General Electric is unique in the industry, being both a manufacturer of plastics molding materials and one of the world's largest plastics molders.

G. E. provides a complete plastics service. It has facilities for producing special types of molding compounds and for designing, engineering, and molding any kind of plastics part or product.

You may breakfast at a dinette table with a surface of G-E Textolite* (a laminated sheet plastics); your toaster may have a base of plastics, molded by G. E.; the breakfast service may be G-E plastics plates and cups in beautiful pastel shades. Your automobile, your refrigerator, your radio, your camera—all are likely to incorporate plastics parts produced by General Electric.

The Scope of G-E Chemical Department's Operations

Molded plastics are just one part of General Electric's Chemical Department's operations. Other products made and sold by the Chemical Department include the amazing new materials of organic-silicon chemistry called silicones, Glyptal* alkyd resins, various insulating materials, and plastics molding compounds. Every month new chemical developments are coming from the G-E research laboratories. And the variety and scope of G-E chemical operations promise to broaden tremendously as this research progresses.

For more information, write Chemical Department, General Electric Company, Pittsfield, Massachusetts.

A message to students of chemistry from

F. W. WARNER

Engineering Manager of the G-E Plastics Division

The rapid growth of the plastics industry in the last ten years offers us some idea of the progress we may expect in plastics within the next decade. For a young man who wants to "grow up" with a rapidly expanding business, the field of plastics seems to offer particularly attractive opportunities.

*REG. U. S. PAT. OFF.

GENERAL ELECTRIC

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PLASTICS MOLDING • SILICONES • INSULATING MATERIALS • GLYPTAL ALKYD RESINS • MOLDING COMPOUNDS